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**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION  
Washington, D.C. 20549**

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**FORM 8-K**

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**CURRENT REPORT  
Pursuant to Section 13 or 15(d)  
of the Securities Exchange Act of 1934**

Date of Report (Data of earliest event reported): **January 14, 2022**

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**X4 PHARMACEUTICALS, INC.**

(Exact name of registrant as specified in its charter)

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**Delaware**  
(State or other jurisdiction of incorporation)

**001-38295**  
(Commission File Number)

**27-3181608**  
(IRS Employer Identification No.)

**61 North Beacon Street, 4th Floor**  
**Boston, Massachusetts**  
(Address of principal executive offices)

**02134**  
(Zip Code)

**(857) 529-8300**  
(Registrant's telephone number, including area code)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions:

- Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
- Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
- Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
- Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

**Securities registered pursuant to Section 12(b) of the Act:**

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, par value \$0.001 per share	XFOR	The Nasdaq Stock Market LLC

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (240.12b-2 of this chapter). Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act

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## **Item 1.01 Entry Into Material Definitive Agreement**

On January 14, 2022, X4 Pharmaceuticals, Inc. (the “Company” and Lincoln Park Capital Fund, LLC (“Lincoln Park”) entered into a purchase agreement (the “Purchase Agreement”) and a registration rights agreement (the “Registration Rights Agreement”), pursuant to which the Company has the right to sell to Lincoln Park shares of the Company’s common stock, par value \$0.001 per share (the “Common Stock”), having an aggregate value of up to \$50,000,000 (the “Purchase Shares”), subject to certain limitations and conditions set forth in the Purchase Agreement. The Company will control the timing and amount of any sales of Purchase Shares to Lincoln Park pursuant to the Purchase Agreement.

In consideration for entering into the Purchase Agreement, the Company agreed to issue 230,414 shares of Common Stock (the “Initial Commitment Shares”) to Lincoln Park as an initial commitment fee. The Company will not receive any cash proceeds from the issuance of the Commitment Shares.

Upon execution of the Purchase Agreement and the Registration Rights Agreement on January 14, 2022, the Company sold to Lincoln Park, as an initial purchase under the Purchase Agreement, 1,382,488 shares of common stock, at a per share price of \$2.17 per share, for aggregate consideration of approximately \$3,000,000.

Under the Purchase Agreement, on any business day after January 14, 2022 selected by the Company over the 36-month term of the Purchase Agreement (each, a “Purchase Date”), the Company may direct Lincoln Park to purchase up to 50,000 shares of Common Stock on such Purchase Date (a “Regular Purchase”) if the closing sale price per share of the Common Stock on the Nasdaq Capital Market is not below \$1.00 on the applicable Purchase Date; provided, however, that (i) a Regular Purchase may be increased to up to 75,000 shares, if the closing sale price per share of the Common Stock on Nasdaq is not below \$7.50 on the applicable Purchase Date; and (ii) a Regular Purchase may be increased to up to 100,000 shares, if the closing sale price per share of the Common Stock on Nasdaq is not below \$10.00 on the applicable Purchase Date. In any case, Lincoln Park’s maximum obligation under any single Regular Purchase will not exceed \$2,000,000, unless the Company and Lincoln Park mutually agree to increase the maximum amount of such Regular Purchase. The above-referenced share amount limitations and closing sale price thresholds are subject to adjustment for any reorganization, recapitalization, non-cash dividend, stock split, reverse stock split or other similar transaction as provided in the Purchase Agreement. The purchase price per share for each such Regular Purchase will be equal to the lesser of:

- the lowest sale price for the Common Stock on the Nasdaq Capital Market on the date of sale; and
- the average of the three lowest closing sale prices for the Common Stock on the Nasdaq Capital Market during the 10 consecutive business days ending on the business day immediately preceding the purchase date.

The Company also has the right to direct Lincoln Park, on any business day on which the Company has properly submitted a Regular Purchase notice for the maximum amount the Company is then permitted to sell to Lincoln Park in such Regular Purchase, to purchase an additional amount of the Common Stock (an “Accelerated Purchase”) of up to the lesser of:

- 300% of the number of shares to be purchased pursuant to such Regular Purchase; and
- 30% of the aggregate shares of the Common Stock traded on the Nasdaq Capital Market during all or, if certain trading volume or market price thresholds specified in the Purchase Agreement are crossed on the applicable Accelerated Purchase date, the portion of the normal trading hours on the applicable Accelerated Purchase date prior to such time that any one of such thresholds is crossed, which period of time on the applicable Accelerated Purchase date is referred to as the Accelerated Purchase Measurement Period.

The parties may mutually agree to increase the number of shares to be purchased by Lincoln Park pursuant to any Accelerated Purchase.

The purchase price per share for each such Accelerated Purchase will be equal to 97% of the lesser of:

- the volume-weighted average price of the Common Stock on the Nasdaq Capital Market during the applicable Accelerated Purchase Measurement Period on the applicable Accelerated Purchase date; and
  - the closing sale price of the Common Stock on the Nasdaq Capital Market on the applicable Accelerated Purchase date.
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The Company also has the right to direct Lincoln Park on any business day on which an Accelerated Purchase has been completed and all of the shares to be purchased thereunder have been properly delivered to Lincoln Park in accordance with the Purchase Agreement to purchase an additional amount of the Common Stock (an "Additional Accelerated Purchase") of up to the lesser of:

- 300% of the number of shares purchased pursuant to the applicable corresponding Regular Purchase; and
- 30% of the aggregate shares of the Common Stock traded on the Nasdaq Capital Market during all or, if certain trading volume or market price thresholds specified in the Purchase Agreement are crossed on the applicable Additional Accelerated Purchase date, the portion of the normal trading hours on the applicable Additional Accelerated Purchase date prior to such time that any one of such thresholds is crossed, which period of time on the applicable Additional Accelerated Purchase date is referred to as the Additional Accelerated Purchase Measurement Period.

The parties may mutually agree to increase the number of shares to be purchased by Lincoln Park pursuant to any Additional Accelerated Purchase.

The Company may, in its sole discretion, submit multiple Additional Accelerated Purchase notices to Lincoln Park on a single Accelerated Purchase date, provided that all prior Accelerated Purchases and Additional Accelerated Purchases (including those that have occurred earlier on the same day) have been completed and all of the shares to be purchased thereunder have been properly delivered to Lincoln Park in accordance with the Purchase Agreement.

The purchase price per share for each such Additional Accelerated Purchase will be equal to 97% of the lower of:

- the volume-weighted average price of the Common Stock on the Nasdaq Capital Market during the applicable Additional Accelerated Purchase Measurement Period on the applicable Additional Accelerated Purchase date; and
- the closing sale price of the Common Stock on the Nasdaq Capital Market on the applicable Additional Accelerated Purchase date.

In the case of Regular Purchases, Accelerated Purchases and Additional Accelerated Purchases, the purchase price per share will be equitably adjusted for any reorganization, recapitalization, non-cash dividend, stock split, reverse stock split or other similar transaction occurring during the business days used to compute the purchase price.

Other than as described above, there are no trading volume requirements or restrictions under the Purchase Agreement, and the Company will control the timing and amount of any sales of Common Stock to Lincoln Park.

The Purchase Agreement prohibits the Company from directing Lincoln Park to purchase any shares of Common Stock if those shares, when aggregated with all other shares of Common Stock then beneficially owned by Lincoln Park (as calculated pursuant to Section 13(d) of the Securities Exchange Act of 1934, as amended, and Rule 13d-3 thereunder), would result in Lincoln Park beneficially owning more than 9.99% of the then total outstanding shares of Common Stock.

Under applicable rules of the Nasdaq Capital Market, the Company may not issue or sell to Lincoln Park under the Purchase Agreement more than 19.99% of the shares of the Common Stock outstanding immediately prior to the execution of the Purchase Agreement (the "Exchange Cap") (or 5,622,718 shares, based on 28,127,657 shares outstanding immediately prior to the execution of the Purchase Agreement), unless (i) the Company obtains stockholder approval to issue shares of its common stock in excess of the Exchange Cap to Lincoln Park under the Purchase Agreement in accordance with applicable Nasdaq rules or (ii) the average price of all applicable sales of Common Stock to Lincoln Park under the Purchase Agreement equals or exceeds \$2.17 per share, which is the lower of (A) the official closing price of the Common Stock on Nasdaq on the date immediately preceding the execution Purchase Agreement and (B) the average official closing price of the Common Stock on Nasdaq for the five consecutive trading days immediately preceding date of the Purchase Agreement, such that the transactions contemplated by the Purchase Agreement are exempt from the Exchange Cap limitation under applicable Nasdaq rules.

The Purchase Agreement does not limit the Company's ability to raise capital from other sources at its sole discretion, except that, subject to certain exceptions, for a period set forth in the Purchase Agreement, the Company may not enter into any equity line of credit or similar continuous offering other than with Lincoln Park, excluding an "at the market offering" of Common Stock exclusively through one or more registered broker dealers.

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The Purchase Agreement and Registration Rights Agreement each contain customary representations, warranties, and agreements of the Company and Lincoln Park, indemnification rights and other obligations of the parties. The Offering of Common Stock pursuant to the Purchase Agreement will terminate on the date that all shares offered by the Purchase Agreement have been sold or, if earlier, the expiration or termination of the Purchase Agreement. The Company has the right to terminate the Purchase Agreement at any time, without fee, penalty or cost to the Company.

Lincoln Park has covenanted not to cause or engage in any manner whatsoever, any direct or indirect short selling or hedging of the Common Stock.

The aggregate net proceeds under the Purchase Agreement to the Company will depend on the frequency and prices at which shares of Common Stock are sold to Lincoln Park. Actual sales of shares of Common Stock to Lincoln Park under the Purchase Agreement and the amount of such net proceeds will depend on a variety of factors to be determined by the Company from time to time, including (among others) market conditions, the trading price of the Common Stock and determinations by the Company as to other available and appropriate sources of funding for the Company. The Company expects to use any proceeds from the sale of the Purchase Shares to develop its product pipeline, for working capital and for general corporate purposes.

The issuance of the Purchase Shares and Commitment Shares have been registered pursuant to the Company's effective shelf registration statement on Form S-3 (File No. 333-242372) (the "Registration Statement"), and the related base prospectus included in the Registration Statement, as supplemented by a prospectus supplement filed on January 14, 2022. A copy of the legal opinion as to the legality of the shares of Common Stock subject to the Purchase Agreement is filed as Exhibit 5.1 attached hereto.

The foregoing is a summary description of certain terms of the Purchase Agreement and the Registration Rights Agreement and, by its nature, is incomplete. Copies of the Purchase Agreement and the Registration Rights Agreement are attached hereto as Exhibit 10.1 and Exhibit 10.2, respectively, and are incorporated herein by reference. The foregoing descriptions of the Purchase Agreement and the Registration Rights Agreement are qualified in their entirety by reference to such exhibits.

The Purchase Agreement and Registration Rights Agreement contain customary representations and warranties, covenants and indemnification provisions that the parties made to, and solely for the benefit of, each other in the context of all of the terms and conditions of such agreements and in the context of the specific relationship between the parties thereto. The provisions of the Purchase Agreement and Registration Rights Agreement, including any representations and warranties contained therein, are not for the benefit of any party other than the parties thereto and are not intended as documents for investors and the public to obtain factual information about the current state of affairs of the parties thereto. Rather, investors and the public should look to other disclosures contained in the Company's annual, quarterly and current reports the Company may file with the Securities and Exchange Commission ("SEC").

The information contained in this Current Report on Form 8-K shall not constitute an offer to sell or the solicitation of an offer to buy the shares of Common Stock discussed herein, nor shall there be any offer, solicitation or sale of the shares in any jurisdiction in which such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of any such jurisdiction.

### **Forward-Looking Statements**

This Current Report on Form 8-K contains "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, including, without limitation, statements about the potential offering of securities under the Purchase Agreement, and other statements containing the words "expect," "intend," "may," "will," and similar expressions, constitute forward-looking statements within the meaning of The Private Securities Litigation Reform Act of 1995. Actual results may differ materially from those indicated by such forward-looking statements as a result of various important factors, including uncertainties related to market conditions, uncertainties inherent in the conduct of ongoing and planned future clinical trials, and such other factors as are set forth under the heading "Risk Factors" in

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the Company's Quarterly Report on Form 10-Q for the quarter ended September 30, 2021, filed with the SEC on November 4, 2021, and in other filings that the Company may make with the SEC in the future. Any forward-looking statements contained in this Form 8-K speak only as of the date hereof, and the Company expressly disclaims any obligation to update any forward-looking statements, whether because of new information, future events or otherwise.

<b>Item 9.01</b>	<b>Financial Statements and Exhibits.</b>
<b><u>Exhibit No.</u></b>	<b><u>Description</u></b>
5.1	<a href="#">Opinion of Cooley LLP.</a>
10.1	<a href="#">Purchase Agreement, dated as of January 14, 2022, by and between X4 Pharmaceuticals, Inc. and Lincoln Park Capital Fund, LLC.</a>
10.2	<a href="#">Registration Rights Agreement, dated as of January 14, 2022, by and between X4 Pharmaceuticals, Inc. and Lincoln Park Capital Fund, LLC.</a>
23.1	<a href="#">Consent of Cooley LLP (contained in Exhibit 5.1).</a>
104	Cover Page Interactive Data File (embedded within the Inline XBRL document)

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## SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934 the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

**X4 PHARMACEUTICALS, INC.**

Date: January 14, 2022

By: /s/ Derek Meisner  
Derek Meisner  
Chief Legal Officer and Secretary

Daniel I. Goldberg  
+1 212 479 6722  
dgoldberg@cooley.com

January 14, 2022

X4 Pharmaceuticals, Inc.  
61 North Beacon Street, 4th Floor  
Boston, MA 02134

Ladies and Gentlemen:

You have requested our opinion with respect to certain matters in connection with the issuance and sale by X4 Pharmaceuticals, Inc., a Delaware corporation (the "**Company**") of 230,414 shares (the "**Commitment Shares**") of the Company's common stock, par value \$0.001 per share ("**Common Stock**"), and additional shares of Common Stock having aggregate sales proceeds of up to \$50,000,000 (the "**Purchase Shares**" and, together with the Commitment Shares, the "**Shares**" pursuant to a Registration Statement on Form S-3 (No. 333-242372) (the "**Registration Statement**") filed with the Securities and Exchange Commission (the "**Commission**") under the Securities Act of 1933, as amended (the "**Act**"), the related prospectus included in the Registration Statement (the "**Base Prospectus**"), and the prospectus supplement filed with the Commission pursuant to Rule 424(b) of the Rules and Regulations of the Act (together with the Base Prospectus, the "**Prospectus**"). The Shares are to be sold by the Company pursuant to that certain Purchase Agreement, dated as of January 14, 2022 (the "**Purchase Agreement**"), by and between the Company and Lincoln Park Capital Fund, LLC, as described in the Prospectus.

In connection with this opinion, we have examined and relied upon (a) the Registration Statement, the Prospectus, and the Purchase Agreement, (b) the Company's Restated Certificate of Incorporation, as amended, and Amended and Restated Bylaws, each as currently in effect, and (c) originals or copies certified to our satisfaction, of such records, documents, certificates, opinions, memoranda and other instruments as in our judgment are necessary or appropriate to enable us to render the opinion expressed below. We have assumed the genuineness of all signatures, the authenticity of all documents submitted to us as originals, the conformity to originals of all documents submitted to us as copies; the accuracy, completeness and authenticity of certificates of public officials and the due authorization, execution and delivery of all documents by all persons other than the Company where due execution and delivery are a prerequisite to the effectiveness thereof. As to certain factual matters, we have relied upon a certificate of an officer of the Company and have not independently verified such matters.

We have assumed (i) that each sale of the Purchase Shares will be duly authorized by the Board of Directors of the Company, a duly authorized committee thereof or a person or body pursuant to an authorization granted in accordance with Section 152 of the General Corporation Law of the State of Delaware (the "**DGCL**") and (ii) that no more than 20,000,000 Purchase Shares will be sold. We express no opinion to the extent that future issuances of securities of the Company and/or anti-dilution adjustments to outstanding securities of the Company cause the number of shares of Common Stock outstanding or issuable upon conversion or exercise of outstanding securities of the Company to exceed the number of Purchase Shares then issuable under the Purchase Agreement.

Our opinion herein is expressed solely with respect to the DGCL. We express no opinion to the extent that any other laws are applicable to the subject matter hereof and express no opinion and provide no assurance as to compliance with any federal or state securities law, rule or regulation.



On the basis of the foregoing and in reliance thereon, and subject to the qualifications herein stated, we are of the opinion that the Shares, when sold and issued in accordance with the Registration Statement, the Prospectus and the Purchase Agreement, will be validly issued, fully paid and nonassessable.

We hereby consent to the reference to our firm under the captions "Legal Matters" in the Prospectus and to the filing of this opinion as an exhibit to a current report of the Company on Form 8-K to be filed with the Commission for incorporation by reference of this opinion into the Registration Statement.

Very truly yours,

**Cooley LLP**

By: /s/ Daniel I. Goldberg  
Daniel I. Goldberg, Partner



## PURCHASE AGREEMENT

THIS PURCHASE AGREEMENT (the "Agreement"), dated as of January 14, 2022, is made by and between X4 PHARMACEUTICALS, INC., a Delaware corporation (the "Company"), and LINCOLN PARK CAPITAL FUND, LLC, an Illinois limited liability company (the "Investor").

## WHEREAS:

Subject to the terms and conditions set forth in this Agreement, the Company wishes to sell to the Investor, and the Investor wishes to buy from the Company, up to Fifty Million Dollars (\$50,000,000) of the Company's common stock, \$0.001 par value per share (the "Common Stock"). The shares of Common Stock to be purchased hereunder (including the Initial Purchase Shares (as defined in Section 2(a) hereof)) are referred to herein as the "Purchase Shares."

NOW THEREFORE, in consideration of the mutual covenants contained in this Agreement, and for other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the Company and the Investor hereby agree as follows:

## 1. CERTAIN DEFINITIONS.

For purposes of this Agreement, the following terms shall have the following meanings:

(a) "Accelerated Purchase Date" means, with respect to any Accelerated Purchase made pursuant to Section 2(c) hereof, the Business Day immediately following the applicable Purchase Date with respect to the corresponding Regular Purchase referred to in Section 2(c) hereof.

(b) "Accelerated Purchase Minimum Price Threshold" means, with respect to any Accelerated Purchase made pursuant to Section 2(c) hereof, any minimum per share price threshold set forth by the Company in the applicable Accelerated Purchase Notice.

(c) "Accelerated Purchase Notice" means, with respect to an Accelerated Purchase made pursuant to Section 2(c) hereof, an irrevocable written notice from the Company to the Investor directing the Investor to purchase the applicable Accelerated Purchase Share Amount at the Accelerated Purchase Price on the Accelerated Purchase Date for such Accelerated Purchase in accordance with this Agreement, and specifying any Additional Accelerated Purchase Minimum Price Threshold determined by the Company.

(d) "Accelerated Purchase Price" means, with respect to an Accelerated Purchase made pursuant to Section 2(c) hereof, the lower of ninety-seven percent (97%) of (i) the VWAP for the period beginning at 9:30:01 a.m., Eastern time, on the applicable Accelerated Purchase Date, or such other time publicly announced by the Principal Market as the official open (or commencement) of trading on the Principal Market on such applicable Accelerated Purchase Date (the "Accelerated Purchase Commencement Time"), and ending at the earliest of (A) 4:00:00 p.m., Eastern time, on such applicable Accelerated Purchase Date, or such other time publicly announced by the Principal Market as the official close of trading on the Principal Market on such applicable Accelerated Purchase Date, (B) such time, from and after the Accelerated Purchase Commencement Time for such Accelerated Purchase, that the total number (or volume) of shares of Common Stock traded on the Principal Market has exceeded the applicable Accelerated Purchase Share Volume Maximum, and (C) such time, from and after the Accelerated Purchase Commencement Time for such Accelerated Purchase, that the Sale Price has fallen below the applicable Accelerated Purchase Minimum Price Threshold (such earliest of (i)(A), (i)(B) and (i)(C) above, the "Accelerated Purchase Termination Time"), and (ii) the Closing Sale Price of the Common Stock on such applicable Accelerated Purchase Date (to be appropriately adjusted for any reorganization, recapitalization, non-cash dividend, stock split, reverse stock split or other similar transaction).

(e) "Accelerated Purchase Share Amount" means, with respect to an Accelerated Purchase made pursuant to Section 2(c) hereof, the number of Purchase Shares directed by the Company to be

purchased by the Investor in an Accelerated Purchase Notice, which number of Purchase Shares shall not exceed the lesser of (i) 300% of the number of Purchase Shares directed by the Company to be purchased by the Investor pursuant to the corresponding Regular Purchase Notice for the corresponding Regular Purchase referred to in Section 2(c) hereof (subject to the Purchase Share limitations contained in Section 2(b) hereof) and (ii) an amount equal to (A) the Accelerated Purchase Share Percentage multiplied by (B) the total number (or volume) of shares of Common Stock traded on the Principal Market during the period on the applicable Accelerated Purchase Date beginning at the Accelerated Purchase Commencement Time for such Accelerated Purchase and ending at the Accelerated Purchase Termination Time for such Accelerated Purchase.

(f) "Accelerated Purchase Share Percentage" means, with respect to an Accelerated Purchase made pursuant to Section 2(c) hereof, thirty percent (30%).

(g) "Accelerated Purchase Share Volume Maximum" means, with respect to an Accelerated Purchase made pursuant to Section 2(c) hereof, a number of shares of Common Stock equal to (i) the applicable Accelerated Purchase Share Amount properly directed by the Company to be purchased by the Investor in the applicable Accelerated Purchase Notice for such Accelerated Purchase, divided by (ii) the Accelerated Purchase Share Percentage (to be appropriately adjusted for any reorganization, recapitalization, non-cash dividend, stock split, reverse stock split or other similar transaction).

(h) "Additional Accelerated Purchase Date" means, with respect to an Additional Accelerated Purchase made pursuant to Section 2(d) hereof, the Business Day (i) that is the Accelerated Purchase Date with respect to the corresponding Accelerated Purchase referred to in Section 2(c) hereof and (ii) on which the Investor receives, prior to 1:00 p.m., Eastern time, on such Business Day, a valid Additional Accelerated Purchase Notice for such Additional Accelerated Purchase in accordance with this Agreement.

(i) "Additional Accelerated Purchase Minimum Price Threshold" means, with respect to an Additional Accelerated Purchase made pursuant to Section 2(d) hereof, any minimum per share price threshold set forth by the Company in the applicable Additional Accelerated Purchase Notice.

(j) "Additional Accelerated Purchase Notice" means, with respect to an Additional Accelerated Purchase made pursuant to Section 2(d) hereof, an irrevocable written notice from the Company to the Investor directing the Investor to purchase the applicable Additional Accelerated Purchase Share Amount at the Additional Accelerated Purchase Price for such Additional Accelerated Purchase in accordance with this Agreement, and specifying any Additional Accelerated Purchase Minimum Price Threshold determined by the Company.

(k) "Additional Accelerated Purchase Price" means, with respect to an Additional Accelerated Purchase made pursuant to Section 2(d) hereof, the lower of ninety-seven percent (97%) of (i) the VWAP for the period on the applicable Additional Accelerated Purchase Date, beginning at the latest of (A) the applicable Accelerated Purchase Termination Time with respect to the corresponding Accelerated Purchase referred to in Section 2(d) hereof on such Additional Accelerated Purchase Date, (B) the applicable Additional Accelerated Purchase Termination Time with respect to the most recently completed prior Additional Accelerated Purchase on such Additional Accelerated Purchase Date, as applicable, and (C) the time at which all Purchase Shares subject to all prior Accelerated Purchases and Additional Accelerated Purchases (as applicable), including, without limitation, those that have been effected on the same Business Day as the applicable Additional Accelerated Purchase Date with respect to which the applicable Additional Accelerated Purchase relates, have theretofore been received by the Investor as DWAC Shares in accordance with this Agreement (such latest of (i)(A), (i)(B) and (i)(C) above, the "Additional Accelerated Purchase Commencement Time"), and ending at the earliest of (X) 4:00 p.m., Eastern time, on such Additional Accelerated Purchase Date, or such other time publicly announced by the Principal Market as the official close of trading on the Principal Market on such Additional Accelerated Purchase Date, (Y) such time, from and after the Additional Accelerated Purchase Commencement Time for such Additional Accelerated Purchase, that the total number (or volume) of shares of Common Stock traded on the Principal Market has exceeded the applicable Additional Accelerated Purchase Share Volume Maximum, and (Z) such time, from and after the Additional

Accelerated Purchase Commencement Time for such Additional Accelerated Purchase, that the Sale Price has fallen below the applicable Additional Accelerated Purchase Minimum Price Threshold (such earliest of (i)(X), (i)(Y) and (i)(Z) above, the "Additional Accelerated Purchase Termination Time"), and (ii) the Closing Sale Price of the Common Stock on such Additional Accelerated Purchase Date (to be appropriately adjusted for any reorganization, recapitalization, non-cash dividend, stock split, reverse stock split or other similar transaction).

(l) "Additional Accelerated Purchase Share Amount" means, with respect to an Additional Accelerated Purchase made pursuant to Section 2(d) hereof, the number of Purchase Shares directed by the Company to be purchased by the Investor on an Additional Accelerated Purchase Notice, which number of Purchase Shares shall not exceed the lesser of (i) 300% of the number of Purchase Shares directed by the Company to be purchased by the Investor pursuant to the corresponding Regular Purchase Notice for the corresponding Regular Purchase referred to in Section 2(d) hereof (subject to the Purchase Share limitations contained in Section 2(a) hereof) and (ii) an amount equal to (A) the Additional Accelerated Purchase Share Percentage multiplied by (B) the total number (or volume) of shares of Common Stock traded on the Principal Market during the period on the applicable Additional Accelerated Purchase Date beginning at the Additional Accelerated Purchase Commencement Time for such Additional Accelerated Purchase and ending at the Additional Accelerated Purchase Termination Time for such Additional Accelerated Purchase.

(m) "Additional Accelerated Purchase Share Percentage" means, with respect to an Additional Accelerated Purchase made pursuant to Section 2(d) hereof, thirty percent (30%).

(n) "Additional Accelerated Purchase Share Volume Maximum" means, with respect to an Additional Accelerated Purchase made pursuant to Section 2(d) hereof, a number of shares of Common Stock equal to (i) the applicable Additional Accelerated Purchase Share Amount properly directed by the Company to be purchased by the Investor in the applicable Additional Accelerated Purchase Notice for such Additional Accelerated Purchase, divided by (ii) the Additional Accelerated Purchase Share Percentage (to be appropriately adjusted for any reorganization, recapitalization, non-cash dividend, stock split, reverse stock split or other similar transaction).

(o) "Alternate Adjusted Regular Purchase Share Limit" means, with respect to a Regular Purchase made pursuant to Section 2(b) hereof, the maximum number of Purchase Shares which, taking into account the applicable per share Purchase Price therefor calculated in accordance with this Agreement, would enable the Company to deliver to the Investor, on the applicable Purchase Date for such Regular Purchase, a Regular Purchase Notice for a Purchase Amount equal to, or as closely approximating without exceeding, Two Hundred Thousand Dollars (\$200,000).

(p) "Available Amount" means, initially, Fifty Million Dollars (\$50,000,000) in the aggregate, which amount shall be reduced by the Purchase Amount each time the Investor purchases shares of Common Stock pursuant to Section 2 hereof.

(q) "Bankruptcy Law" means Title 11, U.S. Code, or any similar federal or state law for the relief of debtors.

(r) "Base Prospectus" means the Company's final base prospectus, dated August 19, 2020, as updated on January 14, 2022 by the Prospectus Supplement including the documents incorporated by reference therein.

(s) "Business Day" means any day on which the Principal Market is open for trading, including any day on which the Principal Market is open for trading for a period of time less than the customary time.

(t) "Closing Sale Price" means, for any security as of any date, the last closing sale price for such security on the Principal Market as reported by the Principal Market.

(u) "Confidential Information" means any information disclosed by either party to the other party, either directly or indirectly, in writing, orally or by inspection of tangible objects (including, without limitation, documents, prototypes, samples, plant and equipment), which is designated, either orally or in writing, as "Confidential," "Proprietary" or some similar designation. Information communicated orally shall be considered Confidential Information if such information is confirmed in writing as being Confidential Information within ten (10) Business Days after the initial disclosure. Confidential Information may also include information disclosed to a disclosing party by third parties. Confidential Information shall not, however, include any information which (i) was publicly known and made generally available in the public domain prior to the time of disclosure by the disclosing party; (ii) becomes publicly known and made generally available after disclosure by the disclosing party to the receiving party through no action or inaction of the receiving party; (iii) is already in the possession of the receiving party without confidential restriction at the time of disclosure by the disclosing party as shown by the receiving party's files and records immediately prior to the time of disclosure; (iv) is obtained by the receiving party from a third party without a breach of such third party's obligations of confidentiality; or (v) is independently developed by the receiving party without use of or reference to the disclosing party's Confidential Information, as shown by documents and other competent evidence in the receiving party's possession; or.

(v) "Custodian" means any receiver, trustee, assignee, liquidator or similar official under any Bankruptcy Law.

(w) "DTC" means The Depository Trust Company, or any successor performing substantially the same function for the Company.

(x) "DWAC Shares" means shares of Common Stock that are (i) issued in electronic form, (ii) freely tradable and transferable and without restriction on resale and (iii) timely credited by the Company, once a DWAC notice is received, to the Investor's or its designee's specified Deposit/Withdrawal at Custodian (DWAC) account with DTC under its Fast Automated Securities Transfer (FAST) Program, or any similar program hereafter adopted by DTC performing substantially the same function.

(y) "Exchange Act" means the Securities Exchange Act of 1934, as amended, and the rules and regulations promulgated thereunder.

(z) "Fully Adjusted Regular Purchase Share Limit" means, with respect to any reorganization, recapitalization, non-cash dividend, stock split or other similar transaction from and after the date of this Agreement, the Regular Purchase Share Limit (as defined in Section 2(b) hereof) in effect on the applicable date of determination, after giving effect to the full proportionate adjustment thereto made pursuant to Section 2(b) hereof for or in respect of such reorganization, recapitalization, non-cash dividend, stock split or other similar transaction.

(aa) "Initial Prospectus Supplement" means the prospectus supplement of the Company relating to the Securities, including the accompanying Base Prospectus, to be prepared and filed by the Company with the SEC pursuant to Rule 424(b)(5) under the Securities Act and in accordance with Section 5(a) hereof, together with all documents and information incorporated therein by reference.

(ab) "Material Adverse Effect" means any material adverse effect on (i) the enforceability of any Transaction Document, (ii) the results of operations, assets, business or financial condition of the Company and its subsidiaries, taken as a whole, other than any material adverse effect that resulted exclusively from (A) any change in the United States or foreign economies or securities or financial markets in general that does not have a disproportionate effect on the Company and its subsidiaries, taken as a whole, (B) any change that generally affects the industry in which the Company and its subsidiaries operate that does not have a disproportionate effect on the Company and its subsidiaries, taken as a whole, (C) any change arising in connection with earthquakes, hostilities, acts of war, sabotage or terrorism or military actions or any escalation or material worsening of any such hostilities, acts of war, sabotage or terrorism or military actions existing as of the date hereof, (D) any action taken by the Investor, its affiliates or its or their successors and assigns with respect to the transactions contemplated

by this Agreement, (E) the effect of any change in applicable laws or accounting rules that does not have a disproportionate effect on the Company and its subsidiaries, taken as a whole, or (F) any change resulting from compliance with terms of this Agreement or the consummation of the transactions contemplated by this Agreement, or (iii) the Company's ability to perform in any material respect on a timely basis its obligations under any Transaction Document to be performed as of the date of determination.

(ac) "Maturity Date" means the first day of the month immediately following the thirty-six (36) month anniversary of the Commencement Date.

(ad) "PEA Period" means the period commencing at 9:30 a.m., Eastern time, on the tenth (10<sup>th</sup>) Business Day immediately prior to the filing of any post-effective amendment to the Registration Statement (as defined herein) or New Registration Statement (as such term is defined in the Registration Rights Agreement), and ending at 9:30 a.m., Eastern time, on the Business Day immediately following, the effective date of any post-effective amendment to the Registration Statement (as defined herein) or New Registration Statement (as such term is defined in the Registration Rights Agreement).

(ae) "Person" means an individual or entity including but not limited to any limited liability company, a partnership, a joint venture, a corporation, a trust, an unincorporated organization and a government or any department or agency thereof.

(af) "Principal Market" means The Nasdaq Capital Market (or any nationally recognized successor thereto); provided, however, that in the event the Company's Common Stock is ever listed or traded on The Nasdaq Global Select Market, The Nasdaq Global Market, the New York Stock Exchange, the NYSE American, the NYSE Arca, the OTC Bulletin Board, or the OTCQX or OTCQB operated by the OTC Markets Group, Inc. (or any nationally recognized successor to any of the foregoing), then the "Principal Market" shall mean such other market or exchange on which the Company's Common Stock is then listed or traded.

(ag) "Prospectus" means the Base Prospectus, as supplemented from time to time by any Prospectus Supplement (including the Initial Prospectus Supplement), including the documents and information incorporated by reference therein.

(ah) "Prospectus Supplement" means any prospectus supplement to the Base Prospectus (including the Initial Prospectus Supplement) filed with the SEC pursuant to Rule 424(b) under the Securities Act in connection with the transactions contemplated by this Agreement, including the documents and information incorporated by reference therein.

(ai) "Purchase Amount" means, with respect to the Initial Purchase, any Regular Purchase, any Accelerated Purchase, or any Additional Accelerated Purchase made hereunder, as applicable, the portion of the Available Amount to be purchased by the Investor pursuant to Section 2 hereof.

(aj) "Purchase Date" means, with respect to a Regular Purchase made pursuant to Section 2(b) hereof, the Business Day on which the Investor receives, after 4:00 p.m., Eastern time, but prior to 6:00 p.m., Eastern time, on such Business Day, a valid Regular Purchase Notice for such Regular Purchase in accordance with this Agreement.

(ak) "Purchase Price" means, with respect to a Regular Purchase made pursuant to Section 2(b) hereof, the lower of: (i) the lowest Sale Price on the Purchase Date for such Regular Purchase and (ii) the arithmetic average of the three (3) lowest Closing Sale Prices for the Common Stock during the ten (10) consecutive Business Days ending on the Business Day immediately preceding such Purchase Date for such Regular Purchase (in each case, to be appropriately adjusted for any reorganization, recapitalization, non-cash dividend, stock split or other similar transaction that occurs on or after the date of this Agreement).

(al) "Registration Rights Agreement" means that certain Registration Rights Agreement, of even date herewith between the Company and the Investor.

(am) "Registration Statement" has the meaning set forth in the Registration Rights Agreement.

(an) "Regular Purchase Notice" means, with respect to a Regular Purchase pursuant to Section 2(b) hereof, an irrevocable written notice from the Company to the Investor directing the Investor to buy a specified number of Purchase Shares (subject to the Purchase Share limitations contained in Section 2(b) hereof) at the applicable Purchase Price for such Regular Purchase in accordance with this Agreement.

(ao) "Sale Price" means any trade price for the shares of Common Stock on the Principal Market as reported by the Principal Market.

(ap) "SEC" means the U.S. Securities and Exchange Commission.

(aq) "Securities" means, collectively, the Purchase Shares and the Commitment Shares (as defined below).

(ar) "Securities Act" means the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder.

(as) "Shelf Registration Statement" has the meaning set forth in the Registration Rights Agreement.

(at) "Subsidiary" means any Person the Company wholly-owns or controls, or in which the Company, directly or indirectly, owns a majority of the voting stock or similar voting interest, in each case that would be disclosable pursuant to Item 601(b)(21) of Regulation S-K promulgated under the Securities Act.

(au) "Transaction Documents" means, collectively, this Agreement and the schedules and exhibits hereto, the Registration Rights Agreement and the schedules and exhibits thereto.

(av) "Transfer Agent" means Computershare Trust Company, N.A., or such other Person who is then serving as the transfer agent for the Company in respect of the Common Stock.

(aw) "VWAP" means in respect of an Accelerated Purchase Date and an Additional Accelerated Purchase Date, as applicable, the volume weighted average price of the Common Stock on the Principal Market, as reported on the Principal Market.

## **2. PURCHASE OF COMMON STOCK.**

Subject to the terms and conditions set forth in this Agreement, the Company has the right to sell to the Investor, and the Investor has the obligation to purchase from the Company, Purchase Shares as follows:

(a) Initial Purchase of Common Stock. Upon the satisfaction of the conditions set forth in Sections 7 and 8 hereof (the "Commencement" and the date of satisfaction of such conditions the "Commencement Date"), the Investor shall purchase 1,382,488 Purchase Shares for an aggregate purchase price of Three Million Dollars (\$3,000,000) (such purchase the "Initial Purchase" and such Purchase Shares, the "Initial Purchase Shares").

(b) Commencement of Regular Sales of Common Stock. Beginning one Business Day following the Commencement Date and thereafter, the Company shall have the right, but not the obligation, to direct the Investor, by its delivery to the Investor of a Regular Purchase Notice from time to time, to purchase up to Fifty Thousand (50,000) Purchase Shares if the Closing Sale Price of the Common Stock on the applicable Purchase Date is not below \$1.00, subject to adjustment as set forth below in this Section 2(b) (such maximum number of Purchase Shares, as may be adjusted from time to time, the "Regular Purchase Share Limit"), at the Purchase Price on the Purchase Date (each such purchase a

"Regular Purchase"); provided, however, that the Regular Purchase Share Limit shall be increased to: (i) Seventy-Five Thousand (75,000) Purchase Shares, if the Closing Sale Price of the Common Stock on the applicable Purchase Date is not below \$7.50, and (ii) One Hundred Thousand (100,000) Purchase Shares, if the Closing Sale Price of the Common Stock on the applicable Purchase Date is not below \$10.00 (all of which share and dollar amounts shall be appropriately proportionately adjusted for any reorganization, recapitalization, non-cash dividend, stock split or other similar transaction); provided that if, after giving effect to the full proportionate adjustment to the Regular Purchase Share Limit therefor, the Fully Adjusted Regular Purchase Share Limit then in effect would preclude the Company from delivering to the Investor a Regular Purchase Notice hereunder for a Purchase Amount (calculated by multiplying (X) the number of Purchase Shares equal to the Fully Adjusted Regular Purchase Share Limit, by (Y) the Purchase Price per Purchase Share covered by such Regular Purchase Notice on the applicable Purchase Date therefor) equal to or greater than the Alternate Adjusted Regular Purchase Share Limit, the Regular Purchase Share Limit for such Regular Purchase Notice shall not be fully adjusted to equal the applicable Fully Adjusted Regular Purchase Share Limit, but rather the Regular Purchase Share Limit for such Regular Purchase Notice shall be adjusted to equal the applicable Alternate Adjusted Regular Purchase Share Limit as of the applicable Purchase Date for such Regular Purchase Notice; and provided, further, however, that the Investor's committed obligation under any single Regular Purchase, other than any Regular Purchase with respect to which an Alternate Adjusted Regular Purchase Share Limit shall apply, shall not exceed Two Million Dollars (\$2,000,000) and provided, further, however, that the parties may mutually agree at any time to increase the any Regular Purchase Share Limit on any Purchase Date to a number of Purchase Shares greater than the limit then in effect. If the Company delivers any Regular Purchase Notice for a Purchase Amount in excess of the limitations contained in the immediately preceding sentence, such Regular Purchase Notice shall be void *ab initio* only with respect to the extent of the amount by which the number of Purchase Shares set forth in such Regular Purchase Notice exceeds the number of Purchase Shares which the Company is permitted to include in such Purchase Notice in accordance herewith, and the Investor shall have no obligation to purchase such excess Purchase Shares in respect of such Regular Purchase Notice; provided, however, that the Investor shall remain obligated to purchase the number of Purchase Shares which the Company is permitted to include in such Regular Purchase Notice. The Company may deliver a Regular Purchase Notice to the Investor as often as every Business Day, provided the Company has not failed to deliver Purchase Shares for the most recent prior Regular Purchase. Notwithstanding the foregoing, the Company shall not deliver any Regular Purchase Notices during the PEA Period.

(c) Accelerated Purchases. Subject to the terms and conditions of this Agreement, from and after one Business Day following the Commencement Date, in addition to purchases of Purchase Shares as described in Section 2(b) above, the Company shall also have the right, but not the obligation, to direct the Investor, by its delivery to the Investor of an Accelerated Purchase Notice from time to time in accordance with this Agreement, to purchase the applicable Accelerated Purchase Share Amount at the Accelerated Purchase Price on the Accelerated Purchase Date therefor in accordance with this Agreement (each such purchase, an "Accelerated Purchase"); provided however, that the parties may mutually agree to increase the Accelerated Purchase Share Amount for any Accelerated Purchase. The Company may deliver an Accelerated Purchase Notice to the Investor only on a Purchase Date on which the Company also properly submitted a Regular Purchase Notice providing for a Regular Purchase of a number of Purchase Shares not less than 50,000 Purchase Shares. If the Company delivers any Accelerated Purchase Notice directing the Investor to purchase an amount of Purchase Shares that exceeds the Accelerated Purchase Share Amount that the Company is then permitted to include in such Accelerated Purchase Notice, such Accelerated Purchase Notice shall be void *ab initio* only with respect to the extent of the amount by which the number of Purchase Shares set forth in such Accelerated Purchase Notice exceeds the Accelerated Purchase Share Amount that the Company is then permitted to include in such Accelerated Purchase Notice (which shall be confirmed in an Accelerated Purchase Confirmation), and the Investor shall have no obligation to purchase such excess Purchase Shares in respect of such Accelerated Purchase Notice; provided, however, that the Investor shall remain obligated to purchase the Accelerated Purchase Share Amount which the Company is permitted to include in such Accelerated Purchase Notice. Within one (1) Business Day after completion of each Accelerated Purchase Date for an Accelerated Purchase, the Investor will provide to the Company a written confirmation of such Accelerated Purchase setting forth the applicable Accelerated Purchase Share Amount and Accelerated Purchase Price for such Accelerated Purchase (each, an "Accelerated Purchase Confirmation").

Notwithstanding the foregoing, the Company shall not deliver any Accelerated Purchase Notices during the PEA Period.

(d) Additional Accelerated Purchases. Subject to the terms and conditions of this Agreement, from and after one Business Day following the Commencement Date, in addition to purchases of Purchase Shares as described in Section 2(b) and Section 2(c) above, the Company shall also have the right, but not the obligation, to direct the Investor, by its timely delivery to the Investor of an Additional Accelerated Purchase Notice on an Additional Accelerated Purchase Date in accordance with this Agreement, to purchase the applicable Additional Accelerated Purchase Share Amount at the applicable Additional Accelerated Purchase Price therefor in accordance with this Agreement (each such purchase, an "Additional Accelerated Purchase"); provided, however, that the parties may mutually agree to increase the Additional Accelerated Purchase Share Amount for any Additional Accelerated Purchase. The Company may deliver multiple Additional Accelerated Purchase Notices to the Investor on an Additional Accelerated Purchase Date; provided, however, that the Company may deliver an Additional Accelerated Purchase Notice to the Investor only (i) on a Business Day that is also the Accelerated Purchase Date for an Accelerated Purchase with respect to which the Company properly submitted to the Investor an Accelerated Purchase Notice in accordance with this Agreement on the applicable Purchase Date for a Regular Purchase of a number of Purchase Shares not less than the Regular Purchase Share Limit then in effect in accordance with this Agreement (including, without limitation, giving effect to any automatic increase to the Regular Purchase Share Limit as a result of the Closing Sale Price of the Common Stock exceeding certain thresholds set forth in Section 2(b) above on such Purchase Date and any other adjustments to the Regular Purchase Share Limit, in each case pursuant to Section 2(b) above), and (ii) if all Purchase Shares subject to all prior Regular Purchases, Accelerated Purchases and Additional Accelerated Purchases, including, without limitation, those that have been effected on the same Business Day as the applicable Additional Accelerated Purchase Date with respect to which the applicable Additional Accelerated Purchase relates, in each case have theretofore been received by the Investor as DWAC Shares in accordance with this Agreement. If the Company delivers any Additional Accelerated Purchase Notice directing the Investor to purchase an amount of Purchase Shares that exceeds the Additional Accelerated Purchase Share Amount that the Company is then permitted to include in such Additional Accelerated Purchase Notice, such Additional Accelerated Purchase Notice shall be void *ab initio* only with respect to the extent of the amount by which the number of Purchase Shares set forth in such Additional Accelerated Purchase Notice exceeds the Additional Accelerated Purchase Share Amount that the Company is then permitted to include in such Additional Accelerated Purchase Notice (which shall be confirmed in an Additional Accelerated Purchase Confirmation), and the Investor shall have no obligation to purchase such excess Purchase Shares in respect of such Additional Accelerated Purchase Notice; provided, however, that the Investor shall remain obligated to purchase the Additional Accelerated Purchase Share Amount which the Company is permitted to include in such Additional Accelerated Purchase Notice. Within one (1) Business Day after completion of each Additional Accelerated Purchase Date, the Investor will provide to the Company a written confirmation of each Additional Accelerated Purchase on such Additional Accelerated Purchase Date setting forth the applicable Additional Accelerated Purchase Share Amount and Additional Accelerated Purchase Price for each such Additional Accelerated Purchase on such Additional Accelerated Purchase Date (each, an "Additional Accelerated Purchase Confirmation"). Notwithstanding the foregoing, the Company shall not deliver any Additional Accelerated Purchase Notices during the PEA Period.

(e) Compliance with Principal Market Rules. Notwithstanding anything in this Agreement to the contrary, and in addition to the limitations set forth in Section 2(f), the Company shall not issue more than 5,622,718 shares (including the Commitment Shares) of Common Stock (the "Exchange Cap") under this Agreement, which equals 19.99% of the Company's outstanding shares of Common Stock as of the date hereof, unless stockholder approval is obtained to issue in excess of the Exchange Cap; provided, however, that the foregoing limitation shall not apply if at any time the Exchange Cap is reached and at all times thereafter the average price paid for all shares of Common Stock issued under this Agreement is equal to or greater than \$2.17 (the "Minimum Price"), a price equal to the lower of (i) the Nasdaq Official Closing Price immediately preceding the execution of this Agreement or (ii) the arithmetic average of the five (5) Nasdaq Official Closing Prices for the Common Stock immediately preceding the execution of this Agreement, as calculated in accordance with the rules of the Principal Market (in such circumstance, for purposes of the Principal Market, the transaction contemplated hereby would not be "below market" and the Exchange Cap would not apply). Notwithstanding the foregoing, the Company shall not be



required or permitted to issue, and the Investor shall not be required to purchase, any shares of Common Stock under this Agreement if such issuance would violate the rules or regulations of the Principal Market. The Company may, in its sole discretion, determine whether to obtain stockholder approval to issue more than 19.99% of its outstanding shares of Common Stock hereunder if such issuance would require stockholder approval under the rules or regulations of the Principal Market. The Exchange Cap shall be reduced, on a share-for-share basis, by the number of shares of Common Stock issued or issuable that may be aggregated with the transactions contemplated by this Agreement under applicable rules of the Principal Market.

(f) Payment for Purchase Shares. For the Initial Purchase and each Regular Purchase, the Investor shall pay to the Company an amount equal to the Purchase Amount with respect to such Initial Purchase or Regular Purchase, as applicable, as full payment for such Purchase Shares via wire transfer of immediately available funds on the same Business Day that the Investor receives such Purchase Shares, if such Purchase Shares are received by the Investor before 1:00 p.m., Eastern time, or, if such Purchase Shares are received by the Investor after 1:00 p.m., Eastern time, the next Business Day. For each Accelerated Purchase and each Additional Accelerated Purchase, the Investor shall pay to the Company an amount equal to the Purchase Amount with respect to such Accelerated Purchase and Additional Accelerated Purchase, respectively, as full payment for such Purchase Shares via wire transfer of immediately available funds on the second Business Day following the date that the Investor receives such Purchase Shares. If the Company or the Transfer Agent shall fail for any reason or for no reason to electronically transfer any Purchase Shares as DWAC Shares with respect to any Regular Purchase, Accelerated Purchase or Additional Accelerated Purchase (as applicable) within two (2) Business Days following the receipt by the Company of the Purchase Price, Accelerated Purchase Price or Additional Accelerated Purchase Price, respectively, therefor in compliance with this Section 2(f), and if on or after such Business Day the Investor purchases (in an open market transaction or otherwise) shares of Common Stock to deliver in satisfaction of a sale by the Investor of such Purchase Shares that the Investor anticipated receiving from the Company in respect of such Regular Purchase, Accelerated Purchase or Additional Accelerated Purchase (as applicable), then the Company shall, within two (2) Business Days after the Investor's request, either (i) pay cash to the Investor in an amount equal to the Investor's total purchase price (including customary brokerage commissions, if any) for the shares of Common Stock so purchased (the "Cover Price"), at which point the Company's obligation to deliver such Purchase Shares as DWAC Shares shall terminate, or (ii) promptly honor its obligation to deliver to the Investor such Purchase Shares as DWAC Shares and pay cash to the Investor in an amount equal to the excess (if any) of the Cover Price over the total Purchase Amount paid by the Investor pursuant to this Agreement for all of the Purchase Shares to be purchased by the Investor in connection with such purchases. The Company shall not issue any fraction of a share of Common Stock upon any Regular Purchase, Accelerated Purchase or Additional Accelerated Purchase. If the issuance would result in the issuance of a fraction of a share of Common Stock, the Company shall round such fraction of a share of Common Stock up or down to the nearest whole share. All payments made under this Agreement shall be made in lawful money of the United States of America or wire transfer of immediately available funds to such account as the Company may from time to time designate by written notice in accordance with the provisions of this Agreement. Whenever any amount expressed to be due by the terms of this Agreement is due on any day that is not a Business Day, the same shall instead be due on the next succeeding day that is a Business Day.

(g) Beneficial Ownership Limitation. Notwithstanding anything to the contrary contained in this Agreement, the Company shall not issue or sell, and the Investor shall not purchase or acquire, any shares of Common Stock under this Agreement which, when aggregated with all other shares of Common Stock then beneficially owned by the Investor and its affiliates (as calculated pursuant to Section 13(d) of the Exchange Act and Rule 13d-3 promulgated thereunder), would result in the beneficial ownership by the Investor and its affiliates of more than 9.99% of the then issued and outstanding shares of Common Stock (the "Beneficial Ownership Limitation"). Upon the written or oral request of the Investor, the Company shall promptly (but not later than one Business Day) confirm orally or in writing to the Investor the number of shares of Common Stock then outstanding. The Investor and the Company shall each cooperate in good faith in the determinations required hereby and the application hereof. The Investor's written certification to the Company of the applicability of the Beneficial Ownership Limitation, and the resulting effect thereof hereunder at any time, shall be conclusive with respect to the applicability thereof and such result absent manifest error.

### 3. INVESTOR'S REPRESENTATIONS AND WARRANTIES.

The Investor represents and warrants to the Company that as of the date hereof and as of the Commencement Date:

(a) Organization, Authority. Investor is an entity duly organized, validly existing and in good standing under the laws of the jurisdiction of its organization, with the requisite power and authority to enter into and to consummate the transactions contemplated by this Agreement and the other Transaction Documents to which it is a party and otherwise to carry out its obligations hereunder and thereunder.

(b) Investment Purpose. The Investor is acquiring the Securities as principal for its own account for investment only and not with a view to or for distributing or reselling such Securities or any part thereof in violation of the Securities Act or any applicable state securities law, has no present intention of distributing any of such Securities in violation of the Securities Act or any applicable state securities law and has no direct or indirect arrangement or understandings with any other Persons to distribute or regarding the distribution of such Securities in violation of the Securities Act or any applicable state securities law (this representation and warranty not limiting the Investor's right to sell the Securities at any time pursuant to the Registration Statement described herein or otherwise in compliance with applicable federal and state securities laws). The Investor is acquiring the Securities hereunder in the ordinary course of its business.

(c) Accredited Investor Status. The Investor is an "accredited investor" as that term is defined in Rule 501(a)(3) of Regulation D promulgated under the Securities Act.

(d) Information. The Investor understands that its investment in the Securities involves a high degree of risk. The Investor (i) is able to bear the economic risk of an investment in the Securities including a total loss thereof, (ii) has such knowledge and experience in financial and business matters that it is capable of evaluating the merits and risks of the proposed investment in the Securities and (iii) has had an opportunity to ask questions of and receive answers from the officers of the Company concerning the financial condition and business of the Company and others matters related to an investment in the Securities. Neither such inquiries nor any other due diligence investigations conducted by the Investor or its representatives shall modify, amend or affect the Investor's right to rely on the Company's representations and warranties contained in Section 4 below. The Investor has sought such accounting, legal and tax advice as it has considered necessary to make an informed investment decision with respect to its acquisition of the Securities and is not relying on any accounting, legal tax or other advice from the Company or its officers, employees or representatives. The Investor acknowledges and agrees that the Company neither makes nor has made any representations or warranties with respect to the transactions contemplated hereby other than those specifically set forth in Section 4 hereof.

(e) No Governmental Review. The Investor understands that no U.S. federal or state agency or any other government or governmental agency has passed on or made any recommendation or endorsement of the Securities or the fairness or suitability of an investment in the Securities nor have such authorities passed upon or endorsed the merits of the offering of the Securities.

(f) Validity; Enforcement. This Agreement and the other Transactional Documents have been duly and validly authorized, executed and delivered on behalf of the Investor and each is a valid and binding agreement of the Investor enforceable against the Investor in accordance with its terms, subject as to enforceability to (y) general principles of equity and to applicable bankruptcy, insolvency, reorganization, moratorium, liquidation and other similar laws relating to, or affecting generally, the enforcement of applicable creditors' rights and remedies and (z) public policy underlying any law, rule or regulation (including any federal or state securities law, rule or regulation) with regards to indemnification, contribution or exculpation.

(g) Residency. The Investor's principal place of business is located in of the State of Illinois.

(h) No Short Selling. The Investor represents and warrants to the Company that at no time prior to the date of this Agreement has any of the Investor, its agents, representatives or affiliates engaged

in or effected, in any manner whatsoever, directly or indirectly, any (i) "short sale" (as such term is defined in Rule 200 of Regulation SHO of the Exchange Act) of the Common Stock or (ii) hedging transaction, which establishes a net short position with respect to the Common Stock.

#### 4. REPRESENTATIONS AND WARRANTIES OF THE COMPANY.

The Company represents and warrants to the Investor that, as of the date hereof and as of the Commencement Date:

(a) Organization and Qualification. The Company and each of the Subsidiaries is an entity duly incorporated or otherwise organized, validly existing and in good standing under the laws of the jurisdiction of its incorporation or organization, with the requisite corporate power and authority to own and use its properties and assets and to carry on its business as currently conducted. Neither the Company nor any Subsidiary is not in violation or default of any of the provisions of its respective certificate or articles of formation or incorporation, bylaws or other organizational or charter documents except as would not be expected to result in a Material Adverse Effect. Each of the Company and the Subsidiaries is duly qualified to conduct business and is in good standing as a foreign corporation or other entity in each jurisdiction in which the nature of the business conducted or property owned by it makes such qualification necessary, and no proceeding has been instituted in any such jurisdiction revoking, limiting or curtailing or seeking to revoke, limit or curtail such power and authority or qualification, except where the failure to be so qualified or in good standing or such proceeding, as the case may be, would not reasonably be expected to result in a Material Adverse Effect. The Company has no Subsidiaries except as set forth in the SEC Documents (as defined below).

(b) Authorization; Enforcement; Validity. (i) The Company has the requisite corporate power and authority to enter into and perform its obligations under this Agreement and the Registration Rights Agreement, and to issue the Securities in accordance with the terms hereof, (ii) the execution and delivery of the Transaction Documents by the Company and the consummation by it of the transactions contemplated hereby and thereby, including without limitation, the issuance of the Commitment Shares (as defined below in Section 5(e)), the reservation for issuance and the issuance of the Purchase Shares issuable under this Agreement, have been duly authorized by the Company's board of directors, or a validly authorized committee thereof (collectively, the "Board of Directors"), and no further consent or authorization is required by the Company, its Board of Directors or any committee thereof, or its stockholders (save to the extent provided in this Agreement), (iii) this Agreement has been, and the Registration Rights Agreement shall be on the Commencement Date, duly executed and delivered by the Company and (iv) this Agreement constitutes, and the Registration Rights Agreement upon its execution on behalf of the Company, shall constitute, the valid and binding obligations of the Company enforceable against the Company in accordance with their terms, except as such enforceability may be limited by general principles of equity or applicable bankruptcy, insolvency, reorganization, moratorium, liquidation or similar laws relating to, or affecting generally, the enforcement of creditors' rights and remedies. The Board of Directors of the Company has approved the resolutions (the "Signing Resolutions") substantially in the form as set forth as Exhibit B attached hereto to authorize this Agreement and the transactions contemplated hereby. The Signing Resolutions are valid, in full force and effect and have not been modified or supplemented in any respect. The Company has delivered to the Investor a true and correct copy of a unanimous written consent adopting the Signing Resolutions executed by all of the members of the Board of Directors of the Company. Except as set forth in this Agreement, no other approvals or consents of the Board of Directors, any other authorized committee thereof, and/or stockholders is necessary under applicable laws and the Company's Restated Certificate of Incorporation, as amended, and/or Amended and Restated By-laws to authorize the execution and delivery of this Agreement or any of the transactions contemplated hereby, including, but not limited to, the issuance of the Commitment Shares and the issuance of the Purchase Shares.

(c) Capitalization. As of the date hereof, the authorized capital stock of the Company consists of 125,000,000 shares of Common Stock, par value \$0.001 per share. Except as disclosed in the SEC Documents (as defined below), (i) no shares of the Company's capital stock are subject to preemptive rights or any other similar rights or any liens or encumbrances suffered or permitted by the Company, (ii) there are no outstanding debt securities, (iii) there are no outstanding options, warrants,

scrip, rights to subscribe to, calls or commitments of any character whatsoever relating to, or securities or rights convertible into, any shares of capital stock of the Company, or contracts, commitments, understandings or arrangements by which the Company is or may become bound to issue additional shares of capital stock of the Company or options, warrants, scrip, rights to subscribe to, calls or commitments of any character whatsoever relating to, or securities or rights convertible into, any shares of capital stock of the Company, (iv) there are no agreements or arrangements under which the Company is obligated to register the sale of any of their securities under the Securities Act (except the Registration Rights Agreement), (v) there are no outstanding securities or instruments of the Company which contain any redemption or similar provisions, and there are no contracts, commitments, understandings or arrangements by which the Company is or may become bound to redeem a security of the Company, (vi) there are no securities or instruments containing anti-dilution or similar provisions that will be triggered by the issuance of the Securities as described in this Agreement and (vii) the Company does not have any stock appreciation rights or "phantom stock" plans or agreements or any similar plan or agreement. The Company has furnished to the Investor true and correct copies of the Restated Certificate of Incorporation, as amended, and the Amended and Restated By-laws, each as in effect on the date hereof, and copies of any documents containing the material rights of holders of securities convertible or exercisable for Common Stock, to the extent not filed as an exhibit to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2020 or other Exchange Act reports.

(d) Issuance of Securities. Upon issuance and payment therefor in accordance with the terms and conditions of this Agreement, the Purchase Shares shall be validly issued, fully paid and nonassessable and free from all taxes, liens, charges, restrictions, rights of first refusal and preemptive rights with respect to the issue thereof, with the holders being entitled to all rights accorded to a holder of Common Stock. Up to \$50,000,000 in shares of Common Stock have been duly authorized and reserved for issuance upon purchase under this Agreement as Purchase Shares (such share number to be adjusted from time to time). 230,414 shares of Common Stock (subject to equitable adjustment for any reorganization, recapitalization, non-cash dividend, stock split or other similar transaction) have been duly authorized and reserved for issuance as Commitment Shares (as defined below in Section 5(e)) in accordance with this Agreement. Upon issuance in accordance with the terms and conditions of this Agreement, the Commitment Shares shall be validly issued, fully paid and nonassessable and free from all taxes, Liens, charges, restrictions, rights of first refusal and preemptive rights with respect to the issue thereof, with the holders being entitled to all rights accorded to a holder of Common Stock.

(e) No Conflicts. The execution, delivery and performance of the Transaction Documents by the Company and the consummation by the Company of the transactions contemplated hereby and thereby (including, without limitation, the reservation for issuance and issuance of the Purchase Shares and the Commitment Shares) will not (i) result in a violation of the Certificate of Incorporation, any Certificate of Designations, Preferences and Rights of any outstanding series of preferred stock of the Company or the Amended and Restated By-laws or (ii) conflict with, or constitute a default (or an event which with notice or lapse of time or both would become a default) under, or give to others any rights of termination, amendment, acceleration or cancellation of, any agreement, indenture or instrument to which the Company is a party, or result in a violation of any law, rule, regulation, order, judgment or decree (including federal and state securities laws and regulations and the rules and regulations of the Principal Market applicable to the Company) or by which any property or asset of the Company is bound or affected, except in the case of conflicts, defaults, terminations, amendments, accelerations, cancellations and violations under clause (ii), which would not reasonably be expected to result in a Material Adverse Effect. The Company is not in violation of any term of or in default under its Certificate of Incorporation, any Certificate of Designation, Preferences and Rights of any outstanding series of preferred stock of the Company or Amended and Restated By-laws or their organizational charter or bylaws, respectively. The Company is not in violation of any term of or is in default under any material contract, agreement, mortgage, indebtedness, indenture, instrument, judgment, decree or order or any statute, rule or regulation applicable to the Company, except for possible conflicts, defaults, terminations or amendments that would not reasonably be expected to have a Material Adverse Effect. The business of the Company is not being conducted, and shall not be conducted, in violation of any law, ordinance or regulation of any governmental entity, except for possible violations, the sanctions for which either individually or in the aggregate would not reasonably be expected to have a Material Adverse Effect. Except as specifically contemplated by this Agreement and as required under the Securities Act or applicable state securities laws and the rules and regulations of the Principal Market, the Company is not required to obtain any

consent, authorization or order of, or make any filing or registration with, any court or governmental agency or any regulatory or self-regulatory agency in order for it to execute, deliver or perform any of its obligations under or contemplated by the Transaction Documents in accordance with the terms hereof or thereof. Except as set forth elsewhere in this Agreement, (i) all consents, authorizations, orders, filings and registrations which the Company is required to obtain pursuant to the preceding sentence on or prior to the date hereof or on or prior to the Commencement Date shall be obtained or effected on or prior to the date hereof and on or prior to the Commencement Date, respectively, and (ii) all consents, authorizations, orders, filings and registrations which the Company is required to obtain pursuant to the preceding sentence with respect to the Commencement shall be obtained or effected on or prior to the Commencement Date.

(f) SEC Documents; Financial Statements. The Company has filed all reports, schedules, forms, statements and other documents required to be filed by the Company under the Securities Act and the Exchange Act, including pursuant to Section 13(a) or 15(d) thereof, for the twelve months preceding the date hereof (or such shorter period as the Company was required by law or regulation to file such material) (the foregoing materials, including the exhibits thereto and documents incorporated by reference therein, together with each Prospectus, being collectively referred to herein as the "SEC Documents") on a timely basis or has received a valid extension of such time of filing and has filed any such SEC Documents prior to the expiration of any such extension. As of their respective dates, the SEC Documents complied in all material respects with the requirements of the Securities Act and the Exchange Act, as applicable. None of the SEC Documents, when filed, contained any untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading. The financial statements of the Company included in the SEC Documents comply in all material respects with applicable accounting requirements and the rules and regulations of the SEC with respect thereto as in effect at the time of filing. Such financial statements have been prepared in accordance with United States generally accepted accounting principles applied on a consistent basis during the periods involved ("GAAP"), except as may be otherwise specified in such financial statements or the notes thereto and except that unaudited financial statements may not contain all footnotes required by GAAP, and fairly present in all material respects the financial position of the Company as of and for the dates thereof and the results of operations and cash flows for the periods then ended, subject, in the case of unaudited statements, to normal, immaterial, year-end audit adjustments. Except as publicly available through the SEC's Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) or in connection with a confidential treatment request submitted to the SEC, the Company has received no notices or correspondence from the SEC for the one year preceding the date hereof other than SEC comment letters relating to the Company's filings under the Exchange Act and the Securities Act. There are no "open" SEC comments. To the Company's knowledge, the SEC has not commenced any enforcement proceedings against the Company.

(g) Absence of Certain Changes. Except as disclosed in the SEC Documents, since September 30, 2021, there has been no material adverse change in the business, properties, operations, financial condition or results of operations of the Company. For purposes of this Agreement, neither a decrease in cash or cash equivalents or in the market price of the Common Stock nor losses incurred in the ordinary course of the Company's business shall be deemed or considered a material adverse change. The Company has not taken any steps, and does not currently expect to take any steps, to seek protection pursuant to any Bankruptcy Law nor does the Company have any knowledge or reason to believe that its creditors intend to initiate involuntary bankruptcy or insolvency proceedings. The Company is financially solvent and is generally able to pay its debts as they become due.

(h) Absence of Litigation. Except as disclosed in the SEC Documents, there is no action, suit, proceeding, inquiry or investigation before or by any court, public board, government agency, self-regulatory organization or body pending or, to the knowledge of the Company, threatened against the Company, the Common Stock or any of the Company's officers or directors in their capacities as such, which would reasonably be expected to have a Material Adverse Effect.

(i) Acknowledgment Regarding Investor's Status. The Company acknowledges and agrees that the Investor is acting solely in the capacity of arm's length purchaser with respect to the Transaction

Documents and the transactions contemplated hereby and thereby. The Company further acknowledges that the Investor is not acting as a financial advisor or fiduciary of the Company (or in any similar capacity) with respect to the Transaction Documents and the transactions contemplated hereby and thereby and any advice given by the Investor or any of its representatives or agents in connection with the Transaction Documents and the transactions contemplated hereby and thereby is merely incidental to the Investor's purchase of the Securities. The Company further represents to the Investor that the Company's decision to enter into the Transaction Documents has been based solely on the independent evaluation by the Company and its representatives and advisors.

(j) No Aggregated Offering. Neither the Company, nor any of its affiliates, nor any Person acting on its or their behalf has, directly or indirectly, made any offers or sales of any security or solicited any offers to buy any security, under circumstances that would cause this offering of the Securities to be integrated or aggregated with prior offerings by the Company in a manner that would require stockholder approval pursuant to the rules of the Principal Market on which any of the securities of the Company are listed or designated. The issuance and sale of the Commitment Shares hereunder does not, and subject to the terms of this Agreement, the issuance and sale of the additional Purchase Shares will not, contravene the rules and regulations of the Principal Market.

(k) Intellectual Property Rights. The Company owns or possesses adequate rights or licenses to use all material trademarks, trade names, service marks, service mark registrations, service names, patents, patent rights, copyrights, inventions, licenses, approvals, governmental authorizations, trade secrets and rights necessary to conduct their respective businesses as now conducted, except to the extent that the failure to own, possess, license or otherwise hold adequate rights to use such intellectual property would not, individually or in the aggregate, have a Material Adverse Effect. None of the Company's material trademarks, trade names, service marks, service mark registrations, service names, patents, patent rights, copyrights, inventions, licenses, approvals, government authorizations, trade secrets or other intellectual property rights have expired or terminated, or, by the terms and conditions thereof, will expire or terminate within two years from the date of this Agreement, except as would not reasonably be expected to have a Material Adverse Effect. Except as set forth in the SEC Documents, the Company does not have any knowledge of any infringement by the Company of any material trademark, trade name rights, patents, patent rights, copyrights, inventions, licenses, service names, service marks, service mark registrations, trade secret or other similar rights of others, or of any such development of similar or identical trade secrets or technical information by others, and there is no claim, action or proceeding that has been brought against, or to the Company's knowledge, being threatened against, the Company regarding trademark, trade name, patents, patent rights, invention, copyright, license, service names, service marks, service mark registrations, trade secret or other infringement, which would reasonably be expected to have a Material Adverse Effect.

(l) Environmental Laws. The Company (i) is in compliance with any and all applicable foreign, federal, state and local laws and regulations relating to the protection of human health and safety, the environment or hazardous or toxic substances or wastes, pollutants or contaminants ("Environmental Laws"), (ii) has received all permits, licenses or other approvals required of them under applicable Environmental Laws to conduct their respective businesses and (iii) is in compliance with all terms and conditions of any such permit, license or approval, except where, in each of the three foregoing clauses, the failure to so comply or to receive such permits, licenses or approvals would not reasonably be expected to have, individually or in the aggregate, a Material Adverse Effect.

(m) Title. Except as set forth in the SEC Documents, the Company has good and marketable title in fee simple to all real property owned by them and good and marketable title in all personal property owned by them that is material to the business of the Company, taken as a whole, in each case free and clear of all liens, encumbrances and defects ("Liens") and, except for Liens as do not materially affect the value of such property and do not materially interfere with the use made and proposed to be made of such property by the Company and Liens for the payment of federal, state or other taxes, the payment of which is neither delinquent nor subject to penalties. Any real property and facilities held under lease by the Company are held by them under valid, subsisting and enforceable leases with which the Company is in compliance with such exceptions as are not material and do not interfere with the use

made and proposed to be made of such property and buildings by the Company, taken as a whole, except for such interference which would not reasonably be expected to have a Material Adverse Effect.

(n) Insurance. The Company is insured by insurers of recognized financial responsibility against such losses and risks and in such amounts as management of the Company believes to be prudent and customary in the businesses in which the Company and its Subsidiaries are engaged. To the Company's knowledge, since March 13, 2019, the Company has not been refused any insurance coverage sought or applied for, and the Company has no reason to believe that it will not be able to renew its existing insurance coverage as and when such coverage expires or to obtain similar coverage from similar insurers as may be necessary to continue its business at a cost that would not reasonably be expected to have a Material Adverse Effect.

(o) Regulatory Permits. Except as disclosed in the SEC Documents, the Company possesses all material certificates, authorizations and permits issued by the appropriate federal, state or foreign regulatory authorities necessary to conduct their respective businesses as currently conducted and the Company has not received any written notice of proceedings relating to the revocation or modification of any such certificate, authorization or permit, except in the case of each of the two foregoing clauses, as would not reasonably be expected to have a Material Adverse Effect.

(p) Tax Status. The Company has made or filed all foreign, federal and state income and all other material tax returns, reports and declarations required by any jurisdiction to which it is subject or otherwise filed timely extensions (unless and only to the extent that the has set aside on its books provisions reasonably adequate for the payment of all unpaid and unreported taxes) and has paid all taxes and other governmental assessments and charges that are material in amount, shown or determined to be due on such returns, reports and declarations, except those being contested in good faith and has set aside on its books provision reasonably adequate for the payment of all taxes for periods subsequent to the periods to which such returns, reports or declarations apply. There are no unpaid taxes in any material amount claimed to be due by the taxing authority of any jurisdiction, and the officers of the Company know of no basis for any such claim.

(q) Transactions With Affiliates. Except as disclosed in the SEC Documents, none of the Company's stockholders, officers or directors or any family member or affiliate of any of the foregoing, has either directly or indirectly an interest in, or is a party to, any transaction that would be required to be disclosed as a related party transaction pursuant to Item 404 of Regulation S-K promulgated under the Securities Act.

(r) Application of Takeover Protections. The Company and its board of directors have taken or will take prior to the Commencement Date all necessary action, if any, in order to render inapplicable any control share acquisition, business combination, poison pill (including any distribution under a rights agreement) or other similar anti-takeover provision under the Certificate of Incorporation or the laws of the state of its incorporation, other than Section 203 of the Delaware General Corporation Law, which is or could become applicable to the Investor as a result of the transactions contemplated by this Agreement, including, without limitation, the Company's issuance of the Securities and the Investor's ownership of the Securities.

(s) Disclosure. Except with respect to the material terms and conditions of the transactions contemplated by the Transaction Documents or any other agreements to be entered into by the Company and the Investor that, in each case, which shall be timely publicly disclosed by the Company, the Company confirms that neither it nor any other Person acting on its behalf has provided the Investor or its agents or counsel with any information that the Company believes constitutes or would reasonably constitute material, non-public information which is not otherwise disclosed in the Registration Statement or the SEC Documents. The Company understands and confirms that the Investor will rely on the foregoing representation in effecting purchases and sales of securities of the Company. All of the disclosure furnished by or on behalf of the Company to the Investor regarding the Company, its business and the transactions contemplated hereby, including the disclosure schedules to this Agreement, is true and correct and does not contain any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements made therein, in light of the circumstances under which they

were made, not misleading. The Company acknowledges and agrees that the Investor neither makes nor has made any representations or warranties with respect to the transactions contemplated hereby other than those specifically set forth in Section 3 hereof.

(t) Foreign Corrupt Practices. Neither the Company nor, to the knowledge of the Company, any director, officer, agent, or employee while acting on behalf of the Company has taken any action, directly or indirectly, that would result in a violation of the Foreign Corrupt Practices Act of 1977, as amended, and the rules and regulations thereunder (the "FCPA"), including, without limitation, making use of the mails or any means or instrumentality of interstate commerce corruptly in furtherance of an offer, payment, promise to pay or authorization of the payment of any money, or other property, gift, promise to give, or authorization of the giving of anything of value to any "foreign official" (as such term is defined in the FCPA) or any foreign political party or official thereof or any candidate for foreign political office, in contravention of the FCPA; and the Company and, to the knowledge of the Company, its affiliates have conducted their businesses in compliance with the FCPA and have instituted and maintain policies and procedures reasonably designed to ensure compliance therewith. The operations of the Company is and has been conducted at all times in compliance with applicable money laundering statutes and the rules and regulations administered or enforced by any applicable governmental agency, including, without limitation, Title 18 U.S. Code section 1956 and 1957, the Patriot Act, the Bank Secrecy Act, and international anti-money laundering principles or procedures by an intergovernmental group or organization, such as the Financial Action Task Force on Money Laundering, of which the United States is a member and with which designation the United States representative to the group or organization continues to concur, all as amended, and any Executive order, directive or regulation pursuant to the authority of any of the foregoing, or any orders or licenses issued thereunder (collectively, the "Money Laundering Laws"), and no action, suit or proceeding by or before any court or governmental agency, authority or body or any arbitrator involving the Company with respect to the Money Laundering Laws is pending or, to the knowledge of the Company, threatened. Neither the Company, nor to the knowledge of the Company any of the directors, officers or employees, agents, or representatives acting on behalf of the Company, is an individual or entity that is, or is owned or controlled by an individual or entity that is: (i) the subject of any sanctions administered or enforced by the U.S. Department of Treasury's Office of Foreign Assets Control, the United Nations Security Council, the European Union, Her Majesty's Treasury, or other relevant sanctions authority (collectively, "Sanctions"), nor (ii) located, organized or resident in a country or territory that is the subject of comprehensive U.S. Sanctions (currently, Cuba, Iran, North Korea, Syria, and the Crimea region of Ukraine). The Company will not, directly or indirectly, use the proceeds of the transactions contemplated hereby, or lend, contribute or otherwise make available such proceeds to any subsidiary, joint venture partner or other individual or entity: (i) to fund or facilitate any activities or business of or with any individual or entity or in any country or territory that, at the time of such funding or facilitation, is the subject of Sanctions prohibiting such funding or facilitation or (ii) in any other manner that will result in a violation of Sanctions by any individual or entity (including any individual or entity participating in the transactions contemplated hereby, whether as underwriter, advisor, investor or otherwise). For the past five years, the Company has not knowingly engaged in, and is not now knowingly engaged in, any dealings or transactions in violation of Sanctions.

(u) DTC Eligibility. The Company, through the Transfer Agent, currently participates in the DTC Fast Automated Securities Transfer (FAST) Program and the Common Stock can be transferred electronically to third parties via the DTC Fast Automated Securities Transfer (FAST) Program.

(v) Sarbanes-Oxley. The Company is in material compliance with all provisions of the Sarbanes-Oxley Act of 2002, as amended, which are applicable to it as of the date hereof.

(w) Certain Fees. No brokerage or finder's fees or commissions are or will be payable by the Company to any broker, financial advisor or consultant, finder, placement agent, investment banker, bank or other Person with respect to the transactions contemplated by the Transaction Documents.

(x) Investment Company. The Company is not required to be registered as, and immediately after receipt of payment for the Purchase Shares will not be required to be registered as, an "investment company" within the meaning of the Investment Company Act of 1940, as amended.



(y) Listing and Maintenance Requirements. The Common Stock is registered pursuant to Section 12(b) of the Exchange Act, and the Company has taken no action designed to, or which to its knowledge is likely to have the effect of, terminating the registration of the Common Stock pursuant to the Exchange Act nor has the Company received any notification that the SEC is currently contemplating terminating such registration. The Securities have been approved for listing on the Principal Market prior to issuance. The Company has taken no action designed to, or likely to have the effect of, delisting the Common Stock from the Principal Market, nor has the Company received any notice from any Person to the effect that the Company is not in compliance with the listing or maintenance requirements of the Principal Market. The Company is, and has no reason to believe that it will not in the foreseeable future continue to be, in compliance with all such listing and maintenance requirements.

(z) Accountants. The Company's accountants are set forth in the SEC Documents and, to the knowledge of the Company, such accountants are an independent registered public accounting firm as required by the Securities Act.

(aa) No Market Manipulation. The Company has not, and to its knowledge no Person acting on its behalf has, (i) taken, directly or indirectly, any action designed to cause or to result in the stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of any of the Securities, (ii) sold, bid for, purchased, or paid any compensation for soliciting purchases of, any of the Securities, or (iii) paid or agreed to pay to any Person any compensation for soliciting another to purchase any other securities of the Company in connection with the transactions contemplated in this Agreement.

(ab) Shell Company Status. The Company is not, and has never been, an issuer identified in Rule 144(i)(1) under the Securities Act and has filed with the SEC current "Form 10 information" (as defined in Rule 144(i)(3) under the Securities Act) at least 12 calendar months prior to the date of this Agreement reflecting its status as an entity that is no longer an issuer identified in Rule 144(i)(1) under the Securities Act.

(ac) No Disqualification Events. None of the Company, any of its predecessors, any affiliated issuer, any director, executive officer, other officer of the Company participating in the offering contemplated hereby, any beneficial owner of 20% or more of the Company's outstanding voting equity securities, calculated on the basis of voting power, nor any promoter (as that term is defined in Rule 405 under the Securities Act) connected with the Company in any capacity at the time of sale (each, an "Issuer Covered Person") is subject to any of the "Bad Actor" disqualifications described in Rule 506(d)(1)(i) to (viii) under the Securities Act (a "Disqualification Event"), except for a Disqualification Event covered by Rule 506(d)(2) or (d)(3) under the Securities Act. The Company has exercised reasonable care to determine whether any Issuer Covered Person is subject to a Disqualification Event.

(ad) Registration Statement. The Company has prepared and filed the Shelf Registration Statement with the SEC in accordance with the Securities Act. The Shelf Registration Statement was declared effective by order of the SEC on August 19, 2020. The Shelf Registration Statement is effective pursuant to the Securities Act and available for the issuance of the Securities thereunder. No stop order suspending the effectiveness of the Shelf Registration Statement has been issued by the SEC, and no proceeding for that purpose or pursuant to Section 8A of the Securities Act against the Company or related to the offering of the Securities has been initiated or, to the knowledge of the Company, threatened by the SEC. The "Plan of Distribution" section of the Prospectus permits the issuance of the Securities under the terms of this Agreement. At the time the Shelf Registration Statement and any amendments thereto became effective, at the date of this Agreement and at each deemed effective date thereof pursuant to Rule 430B(f)(2) of the Securities Act, the Shelf Registration Statement and any amendments thereto complied and will comply in all material respects with the requirements of the Securities Act and did not and will not contain any untrue statement of a material fact or omit to state any material fact required to be stated therein or necessary to make the statements therein not misleading; and the Base Prospectus and any Prospectus Supplement thereto, at the time such Base Prospectus or such Prospectus Supplement thereto was issued and on the Commencement Date, complied and will comply in all material respects with the requirements of the Securities Act and did not and will not contain an untrue statement of a material fact or omit to state a material fact necessary in order to make the statements therein, in light of

the circumstances under which they were made, not misleading; provided that this representation and warranty does not apply to statements in or omissions from any Prospectus Supplement made in reliance upon and in conformity with information relating to the Investor furnished to the Company in writing by or on behalf of the Investor expressly for use therein. The Company meets all of the requirements for the use of a registration statement on Form S-3 pursuant to the Securities Act for the offering and sale of the Securities contemplated by this Agreement in reliance on General Instruction I.B.1., and the SEC has not notified the Company of any objection to the use of the form of the Registration Statement pursuant to Rule 401(g)(1) of the Securities Act. The Company hereby confirms that the issuance of the Securities to the Investor in accordance with this Agreement would not result in non-compliance with the Securities Act or any of the General Instructions to Form S-3. The Registration Statement, as of its effective date, meets the requirements set forth in Rule 415(a)(1)(x) pursuant to the Securities Act. At the earliest time after the filing of the Registration Statement that the Company or another offering participant made a bona fide offer (within the meaning of Rule 164(h)(2) of the Securities Act) relating to any of the Securities, the Company was, and as of the date of this Agreement the Company is, not an Ineligible Issuer (as defined in Rule 405 of the Securities Act). The Company has not distributed any offering material in connection with the offering, issuance and sale of any of the Securities, other than the Shelf Registration Statement or any amendment thereto, the Prospectus or any Prospectus Supplement required pursuant to applicable law or the Transaction Documents. The Company has not made an offer relating to the Securities that would constitute a "free writing prospectus" as defined in Rule 405 under the Securities Act.

## 5. COVENANTS.

(a) **Filing of Current Report and Initial Prospectus Supplement.** The Company agrees that it shall, within the time required under the Exchange Act, file with the SEC a Current Report on Form 8-K relating to the transactions contemplated by, and describing the material terms and conditions of, the Transaction Documents (the "Current Report"). The Company further agrees that it shall, within the time required under Rule 424(b) under the Securities Act, file with the SEC the Initial Prospectus Supplement pursuant to Rule 424(b) under the Securities Act specifically relating to the transactions contemplated by, and describing the material terms and conditions of, the Transaction Documents, containing information previously omitted at the time of effectiveness of the Shelf Registration Statement in reliance on Rule 430B under the Securities Act, and disclosing all information relating to the transactions contemplated hereby required to be disclosed in the Shelf Registration Statement and the Prospectus as of the date of the Initial Prospectus Supplement, including, without limitation, information required to be disclosed in the section captioned "Plan of Distribution" in the Prospectus. The Company shall permit the Investor to review and comment upon the Current Report and the Initial Prospectus Supplement at least two (2) Business Days prior to their filing with the SEC, the Company shall give due consideration to all such comments. The Investor shall use its reasonable best efforts to provide any comments upon the Current Report and the Initial Prospectus Supplement within one (1) Business Day from the date the Investor receives a substantially complete draft thereof from the Company. The Investor shall furnish to the Company such information regarding itself, the Securities held by it and the intended method of distribution thereof, including any arrangement between the Investor and any other Person relating to the sale or distribution of the Securities, as shall be reasonably requested by the Company in connection with the preparation and filing of the Current Report and the Initial Prospectus Supplement, and shall otherwise cooperate with the Company as reasonably requested by the Company in connection with the preparation and filing of the Current Report and the Initial Prospectus Supplement with the SEC.

(b) **Blue Sky.** The Company shall take all such action, if any, as is reasonably necessary in order to obtain an exemption for or to register or qualify (i) the issuance and the sale of the Securities to the Investor under this Agreement and (ii) any subsequent resale of all Commitment Shares and all Purchase Shares by the Investor, in each case, under applicable securities or "Blue Sky" laws of the states of the United States in such states as is reasonably requested by the Investor from time to time, and shall provide evidence of any such action so taken to the Investor at its written request; provided, however, that the Company shall not be obligated to file any general consent to service of process or to qualify as a foreign corporation or as a dealer in securities in any jurisdiction in which it is not so qualified or to subject itself to taxation in respect of doing business in any jurisdiction in which it is not otherwise so subject.

(c) Listing/DTC. The Company shall use commercially reasonable efforts to maintain, so long as any shares of Common Stock shall be so listed, the listing of all Purchase Shares and Commitment Shares from time to time issuable hereunder on the Principal Market. The Company shall use commercially reasonable efforts to maintain the listing of the Common Stock on the Principal Market and shall use commercially reasonable efforts to comply in all respects with the Company's reporting, filing and other obligations under the bylaws or rules and regulations of the Principal Market. The Company shall not take any action that would reasonably be expected to result in the delisting or suspension of the Common Stock on the Principal Market, unless the Common Stock is immediately thereafter traded on the New York Stock Exchange, the NYSE American, the Nasdaq Global Select Market, the Nasdaq Global Market, or the Nasdaq Capital Market. The Company shall promptly provide to the Investor copies of any notices it receives from any Person regarding the continued eligibility of the Common Stock for listing on the Principal Market; provided, however, that the Company shall not be required to provide the Investor copies of any such notice that the Company reasonably believes constitutes material non-public information and the Company would not be required to publicly disclose such notice in any report or statement filed with the SEC and under the Exchange Act or the Securities Act. The Company shall pay all fees and expenses in connection with satisfying its obligations under this Section 5(c). The Company shall take all commercially reasonable action necessary to ensure that its Common Stock can be transferred electronically as DWAC Shares.

(d) Prohibition of Short Sales and Hedging Transactions. The Investor agrees that beginning on the date of this Agreement and ending on the date of termination of this Agreement as provided in Section 11, the Investor and its agents, representatives and affiliates shall not in any manner whatsoever enter into or effect, directly or indirectly, any (i) "short sale" (as such term is defined in Rule 200 of Regulation SHO of the Exchange Act) of the Common Stock or (ii) hedging transaction, which establishes a net short position with respect to the Common Stock.

(e) Issuance of Commitment Shares. In consideration for the Investor's execution and delivery of this Agreement, the Company shall cause the Transfer Agent to issue 230,414 shares of Common Stock (the "Commitment Shares") directly to the Investor in accordance with Section 6 hereto and the Irrevocable Transfer Agent Instructions (as defined below). For the avoidance of doubt, all of the Commitment Shares shall be fully earned as of the date of this Agreement, whether or not the Commencement shall occur or any Purchase Shares are purchased by the Investor under this Agreement and irrespective of any termination of this Agreement.

(f) Due Diligence; Non-Public Information. During the term of this Agreement, the Investor shall have the right, from time to time as the Investor may reasonably deem appropriate, and upon reasonable advance notice to the Company, to perform reasonable due diligence on the Company during normal business hours. The Company and its officers and employees shall provide material information and reasonably cooperate with the Investor in connection with any reasonable request by the Investor related to the Investor's due diligence of the Company. Each party hereto agrees not to disclose any Confidential Information of the other party to any third party and shall not use the Confidential Information for any purpose other than in connection with, or in furtherance of, the transactions contemplated hereby. Each party hereto acknowledges that the Confidential Information shall remain the property of the disclosing party and agrees that it shall take all reasonable measures to protect the secrecy of any Confidential Information disclosed by the other party. The receiving party may disclose Confidential Information to the extent such information is required to be disclosed by law, regulation or order of a court of competent jurisdiction or regulatory authority, provided that the receiving party shall promptly notify the disclosing party when such requirement to disclose arises, and shall cooperate with the disclosing party so as to enable the disclosing party to: (i) seek an appropriate protective order; and (ii) make any applicable claim of confidentiality in respect of such Confidential Information; and provided, further, that the receiving party shall disclose Confidential Information only to the extent required by the protective order or other similar order, if such an order is obtained, and, if no such order is

obtained, the receiving party shall disclose only the minimum amount of such Confidential Information required to be disclosed in order to comply with the applicable law, regulation or order. In addition, any such Confidential Information disclosed pursuant to this section shall continue to be deemed Confidential Information. Notwithstanding anything in this Agreement to the contrary, the Company shall not be obligated to provide the Investor with any information that constitutes or may reasonably be considered to constitute material, non-public information pursuant to a request for information hereunder, and the Company and the Investor agree that neither the Company nor any other Person acting on its behalf shall provide the Investor or its agents or counsel with any information that constitutes or may reasonably be considered to constitute material, non-public information, unless a simultaneous public announcement thereof is made by the Company in the manner contemplated by Regulation FD. In the event of a breach of the foregoing covenant by the Company or any Person acting on its behalf (as determined in the reasonable good faith judgment of the Investor), in addition to any other remedy provided herein or in the other Transaction Documents, if the Investor is holding any Securities at the time of the disclosure of such material non-public information, the Investor shall have the right to make a public disclosure, in the form of a press release, public advertisement or otherwise, of such material, non-public information without the prior approval by the Company; provided the Investor shall have first provided notice to the Company that it believes it has received information that constitutes material, non-public information; and the Company shall have at least two Business Days from such notice to either publicly disclose such material, non-public information or to demonstrate to the Investor that such information does not constitute material, non-public information, and (assuming the Investor and Investor's counsel disagree in their reasonable good faith judgment with the Company's determination) prior to any such disclosure by the Investor; and the Company shall have failed to publicly disclose such material, non-public information. The Investor shall not have any liability to the Company, any of its Subsidiaries, or any of their respective directors, officers, employees, stockholders or agents, for any such disclosure in accordance with this Section 5(f). The Company understands and confirms that the Investor shall be relying on the foregoing covenants in effecting transactions in securities of the Company.

(g) Purchase Records. The Investor and the Company shall each maintain records showing the remaining Available Amount at any given time and the dates and Purchase Amounts for each Regular Purchase, Accelerated Purchase and Additional Accelerated Purchase or shall use such other method, reasonably satisfactory to the Investor and the Company.

(h) Taxes. The Company shall pay any and all transfer, stamp or similar taxes that may be payable with respect to the issuance and delivery of any shares of Common Stock to the Investor made under this Agreement.

(i) Use of Proceeds. The Company will use the net proceeds from the offering for any corporate purpose at the sole discretion of the Company.

(j) Other Transactions. The Company shall not enter into any agreement, plan, arrangement or transaction in or of which the terms thereof would restrict, materially delay, conflict with or impair the ability to perform its obligations under this Agreement and the Registration Rights Agreement, including, without limitation, the obligation of the Company to deliver the Commitment Shares to the Investor.

(k) Aggregation. From and after the date of this Agreement, neither the Company, nor or any of its affiliates will, and the Company shall use its reasonable best efforts to ensure that no Person acting on their behalf will, directly or indirectly, make any offers or sales of any security or solicit any offers to buy any security, under circumstances that would cause this offering of the Securities by the Company to the Investor to be aggregated with other offerings by the Company in a manner that would require

stockholder approval pursuant to the rules of the Principal Market on which any of the securities of the Company are listed or designated, unless stockholder approval is obtained before the closing of such subsequent transaction in accordance with the rules of such Principal Market.

(l) Limitation on Variable Rate Transactions. From and after the date of this Agreement until the earlier of (i) thirty-six (36) month anniversary of the date of this Agreement or (ii) the twelve (12) month anniversary of the termination of this Agreement, the Company shall be prohibited from entering into any “equity line” or similar transaction whereby an investor is irrevocably bound to purchase securities over a period of time from the Company at a price based on the market price of the Common Stock at the time of such purchase; provided, however, that this Section 5(l) shall not be deemed to prohibit the issuance of shares of Common Stock pursuant to an “at-the-market offering” by the Company through a registered broker-dealer acting as agent of the Company pursuant to a written agreement between the Company and such registered broker-dealer. The Investor shall be entitled to seek injunctive relief against the Company to preclude any such issuance, which remedy shall be in addition to any right to collect damages, without the necessity of showing economic loss and without any bond or other security being required.

## **6. TRANSFER AGENT INSTRUCTIONS.**

(a) Commitment Shares. No later than the date of filing of the Initial Prospectus Supplement, the Company shall issue to the Transfer Agent (and any subsequent transfer agent) irrevocable instructions, in the form agreed to prior to the date hereof (the "Irrevocable Transfer Agent Instructions"), to issue the Commitment Shares in accordance with the terms of this Agreement. All Commitment Shares to be issued to or for the benefit of the Investor pursuant to this Agreement shall be issued as DWAC Shares. The Company warrants to the Investor that, while the Agreement is effective, no instruction other than the Irrevocable Transfer Agent Instructions referred to in this Section 6 will be given by the Company to the Transfer Agent with respect to the Commitment Shares, and the Commitment Shares shall otherwise be freely transferable on the books and records of the Company.

(b) Purchase Shares. On the date of the Initial Prospectus Supplement, the Company shall issue to the Transfer Agent, and any subsequent transfer agent, irrevocable instructions in the form agreed to prior to the date hereof (the "Commencement Irrevocable Transfer Agent Instructions") to issue the Purchase Shares in accordance with the terms of this Agreement and the Registration Rights Agreement. All Purchase Shares to be issued from and after Commencement to or for the benefit of the Investor pursuant to this Agreement shall be issued only as DWAC Shares. The Company represents and warrants to the Investor that, while this Agreement is effective, no instruction other than as contemplated by the Commencement Irrevocable Transfer Agent Instructions and any Notice of Effectiveness of Registration Statement (as defined in the Registration Rights Agreement) will be given by the Company to the Transfer Agent with respect to the Purchase Shares from and after Commencement, and no instruction or other communication to the Transfer Agent with respect to the issuance of the Purchase Shares shall be made without the approval of the Investor. The Company shall provide confirmation of receipt by the Transfer Agent of all instructions pursuant to the Commencement Irrevocable Transfer Agent Instructions with respect to Purchase Shares within one Business Day of delivery of any Purchase Notice. The Purchase Shares covered by the Registration Statement shall otherwise be freely transferable on the books and records of the Company.

## **7. CONDITIONS TO THE COMPANY’S RIGHT TO COMMENCE SALES OF SHARES OF COMMON STOCK.**

The right of the Company hereunder to commence sales of Purchase Shares is subject to the satisfaction, or where legally permissible, the waiver of each of the following conditions:

- (a) The Investor shall have executed each of the Transaction Documents and delivered the same to the Company;
- (b) The representations and warranties of the Investor shall be true and correct in all material respects as of the date hereof and as of the Commencement Date as though made at that time; and
- (c) No stop order with respect to the Registration Statement shall be pending or threatened by the SEC.

**8. CONDITIONS TO THE INVESTOR'S OBLIGATION TO PURCHASE SHARES OF COMMON STOCK.**

The obligation of the Investor to buy Purchase Shares under this Agreement is subject to the satisfaction or, where legally permissible, the waiver of each of the following conditions on or prior to the Commencement Date and, once such conditions have been initially satisfied, there shall not be any ongoing obligation to satisfy such conditions after the Commencement has occurred:

- (a) The Company shall have executed each of the Transaction Documents and delivered the same to the Investor;
- (b) The Company shall have issued or caused to be issued to the Investor a number of shares of Common Stock equal to the number of Commitment Shares as DWAC Shares, in each case in accordance with Section 6;
- (c) The Common Stock shall be listed on the Principal Market, and the Company shall have filed with The Nasdaq Stock Market a Listing of Additional Shares Notification Form for the listing of the Securities, and Nasdaq shall have raised no objection to the consummation of the transactions contemplated by this Agreement;
- (d) The Investor shall have received the opinion and negative assurances letter of the Company's legal counsel dated as of the Commencement Date substantially in the forms agreed prior to the date of this Agreement by the Company's legal counsel and the Investor's legal counsel;
- (e) The representations and warranties of the Company in this Agreement shall be true and correct in all material respects (except to the extent that any of such representations and warranties is already qualified as to materiality in Section 4 above, in which case, such representations and warranties shall be true and correct without further qualification) as of the date hereof and as of the Commencement Date as though made at that time (except for representations and warranties that speak as of a specific date, which shall be true and correct in all material respects as of such date) and the Company shall have performed, satisfied and complied in all material respects with the covenants, agreements and conditions required by the Transaction Documents to be performed, satisfied or complied with by the Company at or prior to the Commencement Date. The Investor shall have received a certificate, executed by the CEO, President or CFO of the Company, dated as of the Commencement Date, to the foregoing effect in the form attached hereto as Exhibit A;
- (f) The Board of Directors of the Company shall have adopted resolutions in substantially the form attached hereto as Exhibit B which shall be in full force and effect without any amendment or supplement thereto as of the Commencement Date;
- (g) As of the Commencement Date, the Company shall have reserved out of its authorized and unissued Common Stock, solely for the purpose of effecting purchases of Purchase Shares hereunder, at least 5,622,718 shares of Common Stock;
- (h) Each of the Irrevocable Transfer Agent Instructions and the Commencement Irrevocable Transfer Agent Instructions shall have been delivered to and acknowledged in writing by the Company and the Transfer Agent (or any successor transfer agent);

(i) The Company shall have delivered to the Investor a certificate evidencing the incorporation and good standing of the Company in the State of Delaware issued by the Secretary of State of the State of Delaware as of a date within ten (10) Business Days of the Commencement Date;

(j) The Company shall have delivered to the Investor a certified copy of the Certificate of Incorporation as certified by the Secretary of State of the State of Delaware within ten (10) Business Days of the Commencement Date;

(k) The Company shall have delivered to the Investor a secretary's certificate executed by the Secretary of the Company, dated as of the Commencement Date, in the form attached hereto as **Exhibit C**;

(l) The Shelf Registration Statement shall continue to be effective and no stop order with respect to the Shelf Registration Statement shall be pending or threatened by the SEC. The Company shall have a maximum dollar amount certain of Common Stock registered under the Shelf Registration Statement which is sufficient to issue to the Investor not less than (i) the full Available Amount worth of Purchase Shares plus (ii) all of the Commitment Shares. The Current Report and the Initial Prospectus Supplement each shall have been filed with the SEC, as required pursuant to **Section 5(a)**, and copies of the Prospectus shall have been delivered to the Investor in accordance with the terms of the Registration Rights Agreement. The Prospectus shall be current and available for issuances and sales of all of the Securities by the Company to the Investor. Any other Prospectus Supplements required to have been filed by the Company with the SEC under the Securities Act at or prior to the Commencement Date shall have been filed with the SEC within the applicable time periods prescribed for such filings under the Securities Act. All reports, schedules, registrations, forms, statements, information and other documents required to have been filed by the Company with the SEC at or prior to the Commencement Date pursuant to the reporting requirements of the Exchange Act shall have been filed with the SEC within the applicable time periods prescribed for such filings under the Exchange Act;

(m) No Event of Default has occurred, and no event which, after notice and/or lapse of time, would reasonably be expected to become an Event of Default has occurred;

(n) The Exchange Cap has not been reached (to the extent the Exchange Cap is applicable pursuant to Section 2(e) hereof);

(o) All federal, state and local governmental laws, rules and regulations applicable to the transactions contemplated by the Transaction Documents and necessary for the execution, delivery and performance of the Transaction Documents and the consummation of the transactions contemplated thereby in accordance with the terms thereof shall have been complied with, and all consents, authorizations and orders of, and all filings and registrations with, all federal, state and local courts or governmental agencies and all federal, state and local regulatory or self-regulatory agencies necessary for the execution, delivery and performance of the Transaction Documents and the consummation of the transactions contemplated thereby in accordance with the terms thereof shall have been obtained or made, including, without limitation, in each case those required under the Securities Act, the Exchange Act, applicable state securities or "Blue Sky" laws or applicable rules and regulations of the Principal Market, or otherwise required by the SEC, the Principal Market or any state securities regulators;

(p) No statute, regulation, order, decree, writ, ruling or injunction shall have been enacted, entered, promulgated, threatened or endorsed by any federal, state or local or foreign court or governmental authority of competent jurisdiction which prohibits the consummation of or which would materially modify or delay any of the transactions contemplated by the Transaction Documents; and

(q) No action, suit or proceeding before any federal, state, local or foreign arbitrator or any court or governmental authority of competent jurisdiction shall have been commenced or threatened, and no inquiry or investigation by any federal, state, local or foreign governmental authority of competent jurisdiction shall have been commenced or threatened, against the Company, or any of the officers, directors or affiliates of the Company, seeking to restrain, prevent or change the transactions

contemplated by the Transaction Documents, or seeking material damages in connection with such transactions.

## 9. INDEMNIFICATION.

In consideration of the Investor's execution and delivery of the Transaction Documents and acquiring the Purchase Shares hereunder and in addition to all of the Company's other obligations under the Transaction Documents, the Company shall defend, protect, indemnify and hold harmless the Investor and all of its affiliates, members, officers, directors and employees and any of the foregoing Person's agents or other representatives (including, without limitation, those retained in connection with the transactions contemplated by this Agreement) (collectively, the "Indemnitees") from and against any and all actions, causes of action, suits, claims, losses, costs, penalties, fees, liabilities and damages, and reasonable expenses in connection therewith (irrespective of whether any such Indemnitee is a party to the action for which indemnification hereunder is sought), and including reasonable and documented attorneys' fees and disbursements (the "Indemnified Liabilities"), incurred by any Indemnitee as a result of, or arising out of, or relating to (a) any misrepresentation or breach of any representation or warranty made by the Company in the Transaction Documents or any other certificate, instrument or document executed by the Company contemplated hereby or thereby, (b) any breach of any covenant, agreement or obligation of the Company contained in the Transaction Documents or any other certificate, instrument or document executed by the Company contemplated hereby or thereby, (c) any cause of action, suit or claim brought or made against such Indemnitee and arising out of or resulting from the execution, delivery, performance or enforcement of the Transaction Documents or any other certificate, instrument or document contemplated hereby or thereby, other than, in the case of clause (c) with respect to Indemnified Liabilities which directly and primarily result from (A) a breach of any of the Investor's representations and warranties, covenants or agreements contained in this Agreement, or (B) the fraud, gross negligence or willful misconduct of an Indemnitee. The indemnity in this Section 9 shall not apply to amounts paid in settlement of any claim if such settlement is effected without the prior written consent of the Company, which consent shall not be unreasonably withheld, conditioned or delayed. To the extent that the foregoing undertaking by the Company may be unenforceable for any reason, the Company shall make the maximum contribution to the payment and satisfaction of each of the Indemnified Liabilities which is permissible under applicable law. Payment under this indemnification shall be made within thirty (30) days from the date the Investor makes written request for it. A certificate containing reasonable detail as to the amount of such indemnification submitted to the Company by the Investor shall be conclusive evidence, absent manifest error, of the amount due from the Company to the Investor, provided that the Indemnitee shall undertake to repay any amounts paid to it hereunder if it is ultimately determined, by a final and non-appealable order of a court of competent jurisdiction, that the Indemnitee is not entitled to be indemnified against such Indemnified Liabilities by the Company pursuant to this Agreement. If any action shall be brought against any Indemnitee in respect of which indemnity may be sought pursuant to this Agreement, such Indemnitee shall promptly notify the Company in writing, and the Company shall have the right to assume the defense thereof with counsel of its own choosing reasonably acceptable to the Indemnitee. Any Indemnitee shall have the right to employ separate counsel in any such action and participate in the defense thereof, but the fees and expenses of such counsel shall be at the expense of such Indemnitee, except to the extent that (i) the employment thereof has been specifically authorized by the Company in writing, (ii) the Company has failed after a reasonable period of time to assume such defense and to employ counsel or (iii) in such action there is, in the reasonable opinion of such separate counsel, a material conflict on any material issue between the position of the Company and the position of such Indemnitee, in which case the Company shall be responsible for the reasonable fees and expenses of no more than one such separate counsel.

## 10. EVENTS OF DEFAULT.

An "Event of Default" shall be deemed to have occurred at any time as any of the following events occurs:

(a) the effectiveness of a Registration Statement registering the sale or resale of the Securities lapses for any reason (including, without limitation, the issuance of a stop order or similar order) or such registration statement (or the prospectus forming a part thereof) is unavailable to the



Investor for sale or resale of any or all of the Securities to be issued to the Investor under the Transaction Documents that are required to be included therein, and such lapse or unavailability continues for a period of ten (10) consecutive Business Days or for more than an aggregate of thirty (30) Business Days in any 365-day period, but excluding a lapse or unavailability where (i) the Company terminates a Registration Statement after the Investor has confirmed in writing that all of the Securities covered thereby have been resold or (ii) the Company supersedes one Registration Statement with another Registration Statement, including (without limitation) by terminating a prior Registration Statement when it is effectively replaced with a new Registration Statement covering Securities (provided in the case of this clause (ii) that all of the Securities covered by the superseded (or terminated) Registration Statement that have not theretofore been resold are included in the superseding (or new) Registration Statement);

(b) the suspension of the Common Stock from trading on the Principal Market for a period of at least one (1) Business Day, provided that the Company may not direct the Investor to purchase any shares of Common Stock during any such suspension;

(c) the delisting of the Common Stock from The Nasdaq Capital Market, provided, however, that the Common Stock is not immediately thereafter trading on The Nasdaq Global Select Market, The Nasdaq Global Market, The Nasdaq Capital Market, the New York Stock Exchange, the NYSE American, the NYSE Arca, the OTC Bulletin Board, or the OTCQB or the OTCQX operated by the OTC Markets Group, Inc. (or any nationally recognized successor to any of the foregoing);

(d) the failure for any reason by the Transfer Agent to issue Purchase Shares to the Investor within two (2) Business Days after the applicable Purchase Date, Accelerated Purchase Date or Additional Accelerated Purchase Date (as applicable) on which the Investor is entitled to receive such Purchase Shares;

(e) the Company breaches any representation, warranty, covenant or other term or condition under any Transaction Document if such breach would reasonably be expected to have a Material Adverse Effect and except, in the case of a breach of a covenant which is reasonably curable, only if such breach continues for a period of at least five (5) Business Days;

(f) if any Person commences a proceeding against the Company pursuant to or within the meaning of any Bankruptcy Law;

(g) if the Company is at any time insolvent, or, pursuant to or within the meaning of any Bankruptcy Law, (i) commences a voluntary case, (ii) consents to the entry of an order for relief against it in an involuntary case, (iii) consents to the appointment of a Custodian of it or for all or substantially all of its property, or (iv) makes a general assignment for the benefit of its creditors or is generally unable to pay its debts as the same become due;

(h) a court of competent jurisdiction enters an order or decree under any Bankruptcy Law that (i) is for relief against the Company in an involuntary case, (ii) appoints a Custodian of the Company or for all or substantially all of its property, or (iii) orders the liquidation of the Company; or

(i) if at any time the Company is not eligible to transfer its Common Stock electronically as DWAC Shares or if the Company fails to maintain the service of its Transfer Agent (or a successor Transfer Agent) with respect to the issuance of Purchase Shares under this Agreement, including but not limited to, maintaining the effectiveness of the Commencement Irrevocable Transfer Instructions, payment of all fees owed to the Transfer Agent and satisfaction of all conditions required by the Transfer Agent to issue Purchase Shares pursuant to the Commencement Irrevocable Transfer Agent Instructions.

In addition to any other rights and remedies under applicable law and this Agreement, so long as (i) an Event of Default has occurred and is continuing, or if any event that, after notice and/or lapse of time, would reasonably be expected to become an Event of Default, has occurred and is continuing or (ii) if at any time after the Commencement Date, the Exchange Cap is reached (to the extent the Exchange Cap is applicable pursuant to Section 2(e) hereof), the Company shall not deliver to the Investor any Regular Purchase Notice, Accelerated Purchase Notice or Additional Purchase Notice.

## 11. TERMINATION

This Agreement may be terminated only as follows:

(a) If pursuant to or within the meaning of any Bankruptcy Law, the Company commences a voluntary case or any Person commences a proceeding against the Company, a Custodian is appointed for the Company or for all or substantially all of its property, or the Company makes a general assignment for the benefit of its creditors (any of which would be an Event of Default as described in Sections 10(f), 10(g) and 10(h) hereof), this Agreement shall automatically terminate without any liability or payment to the Company (except as set forth below) without further action or notice by any Person.

(b) At any time after the Commencement Date, the Company shall have the option to terminate this Agreement for any reason or for no reason by delivering notice (a "Company Termination Notice") to the Investor electing to terminate this Agreement without any liability whatsoever of any party to any other party under this Agreement (except as set forth below). The Company Termination Notice shall not be effective until one (1) Business Day after it has been received by the Investor.

(c) This Agreement shall automatically terminate on the date that the Company sells and the Investor purchases the full Available Amount as provided herein, without any action or notice on the part of any party and without any liability whatsoever of any party to any other party under this Agreement (except as set forth below).

(d) If, for any reason or for no reason, the full Available Amount has not been purchased in accordance with Section 2 of this Agreement by the Maturity Date, this Agreement shall automatically terminate on the Maturity Date, without any action or notice on the part of any party and without any liability whatsoever of any party to any other party under this Agreement (except as set forth below).

Except as set forth in Sections 11(a) (in respect of an Event of Default under Sections 10(f), 10(g) and 10(h)), and 11(d), any termination of this Agreement pursuant to this Section 11 shall be effected by written notice from the Company to the Investor, or the Investor to the Company, as the case may be, setting forth the basis for the termination hereof. The representations and warranties and covenants of the Company and the Investor contained in Sections 3, 4, 5, and 6 hereof, the indemnification provisions set forth in Section 9 hereof and the agreements and covenants set forth in Sections 10, 11 and 12 shall survive the execution and delivery of this Agreement and any termination of this Agreement. No termination of this Agreement shall (i) affect the Company's or the Investor's rights or obligations under (A) this Agreement with respect to any pending Initial Purchase, Regular Purchases, Accelerated Purchases, or Additional Purchases, and the Company and the Investor shall complete their respective obligations with respect to any pending Initial Purchase, Regular Purchases, Accelerated Purchases and Additional Purchases under this Agreement and (B) the Registration Rights Agreement, which shall survive any such termination, or (ii) be deemed to release the Company or the Investor from any liability for intentional misrepresentation or willful breach of any of the Transaction Documents.

## 12. MISCELLANEOUS.

(a) Governing Law; Jurisdiction; Jury Trial. The corporate laws of the State of Delaware shall govern all issues concerning the relative rights of the Company and its stockholders. All other questions concerning the construction, validity, enforcement and interpretation of this Agreement and the other Transaction Documents shall be governed by the internal laws of the State of Illinois, without giving effect to any choice of law or conflict of law provision or rule (whether of the State of Illinois or any other jurisdictions) that would cause the application of the laws of any jurisdictions other than the State of Illinois. Each party hereby irrevocably submits to the exclusive jurisdiction of the state and federal courts sitting in the State of Illinois, County of Cook, for the adjudication of any dispute hereunder or under the other Transaction Documents or in connection herewith or therewith, or with any transaction contemplated hereby or discussed herein, and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of any such court, that such suit, action or proceeding is brought in an inconvenient forum or that the venue of such suit, action or proceeding is improper. Each party hereby irrevocably waives personal service of

process and consents to process being served in any such suit, action or proceeding by mailing a copy thereof to such party at the address for such notices to it under this Agreement and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any manner permitted by law. **EACH PARTY HEREBY IRREVOCABLY WAIVES ANY RIGHT IT MAY HAVE, AND AGREES NOT TO REQUEST, A JURY TRIAL FOR THE ADJUDICATION OF ANY DISPUTE HEREUNDER OR IN CONNECTION HERewith OR ARISING OUT OF THIS AGREEMENT OR ANY TRANSACTION CONTEMPLATED HEREBY.**

(b) Counterparts. This Agreement may be executed in two or more identical counterparts, all of which shall be considered one and the same agreement and shall become effective when counterparts have been signed by each party and delivered to the other party; provided that a facsimile signature or signature delivered by e-mail in a ".pdf" format data file shall be considered due execution and shall be binding upon the signatory thereto with the same force and effect as if the signature were an original signature.

(c) Headings. The headings of this Agreement are for convenience of reference and shall not form part of, or affect the interpretation of, this Agreement.

(d) Severability. If any provision of this Agreement shall be invalid or unenforceable in any jurisdiction, such invalidity or unenforceability shall not affect the validity or enforceability of the remainder of this Agreement in that jurisdiction or the validity or enforceability of any provision of this Agreement in any other jurisdiction.

(e) Entire Agreement. The Transaction Documents supersede all other prior oral or written agreements between the Investor, the Company, their affiliates and Persons acting on their behalf with respect to the subject matter thereof, and this Agreement, the other Transaction Documents and the instruments referenced herein contain the entire understanding of the parties with respect to the matters covered herein and therein and, except as specifically set forth herein or therein, neither the Company nor the Investor makes any representation, warranty, covenant or undertaking with respect to such matters. The Company acknowledges and agrees that it has not relied on, in any manner whatsoever, any representations or statements, written or oral, other than as expressly set forth in the Transaction Documents. The Investor acknowledges and agrees that it has not relied on, in any manner whatsoever, any representations or statements, written or oral, other than as expressly set forth in the Transaction Documents.

(f) Notices. Any notices, consents or other communications required or permitted to be given under the terms of this Agreement must be in writing and will be deemed to have been delivered: (i) upon receipt when delivered personally; (ii) upon receipt when sent by facsimile or email (provided confirmation of transmission is mechanically or electronically generated and kept on file by the sending party); or (iii) one Business Day after deposit with a nationally recognized overnight delivery service, in each case properly addressed to the party to receive the same. The addresses for such communications shall be:

If to the Company:

X4 Pharmaceuticals, Inc.  
61 N. Beacon Street  
4<sup>th</sup> Floor  
Boston, MA 02134  
Telephone: 857-529-8300  
E-mail: adam.mostafa@x4pharma.com  
Attention: Adam Mostafa, Chief Financial Officer

With a copy to (which shall not constitute notice or service of process):  
Cooley LLP

55 Hudson Yards  
New York, NY 10001  
Telephone: (212)479-5000  
Facsimile: (212)479-6275  
Email: dgoldberg@x4pharma.com  
Attention: Daniel I. Goldberg

If to the Investor:

Lincoln Park Capital Fund, LLC  
440 North Wells, Suite 410  
Chicago, IL 60654  
Telephone: 312-822-9300  
Facsimile: 312-822-9301  
E-mail: jscheinfeld@lpcfunds.com/jcope@lpcfunds.com  
Attention: Josh Scheinfeld/Jonathan Cope

With a copy to (which shall not constitute notice or service of process):

K&L Gates LLP  
200 S. Biscayne Blvd., Suite 3900  
Miami, FL 33131  
Telephone: (305) 539-3306  
Facsimile: (305) 358-7095  
E-mail: clayton.parker@klgates.com  
Attention: Clayton E. Parker, Esq.

If to the Transfer Agent:

Computershare Trust Company, N.A.  
Transfer Agent and Registrar  
250 Royall Street  
Canton, MA 02021  
  
Telephone: (502) 315-9445  
Facsimile: (888) 742-5671  
Email: June.Lutes@computershare.com  
Attention: June Lutes

or at such other address, email address and/or facsimile number and/or to the attention of such other Person as the recipient party has specified by written notice given to each other party three (3) Business Days prior to the effectiveness of such change. Written confirmation of receipt (A) given by the recipient of such notice, consent or other communication, (B) mechanically or electronically generated by the sender's facsimile machine or email account containing the time, date, and recipient facsimile number or email address, as applicable, or (C) provided by a nationally recognized overnight delivery service, shall be rebuttable evidence of personal service, receipt by facsimile or email or receipt from a nationally recognized overnight delivery service in accordance with clause (i), (ii) or (iii) above, respectively.

(g) Successors and Assigns. This Agreement shall be binding upon and inure to the benefit of the parties and their respective successors and assigns. The Company shall not assign this Agreement or any rights or obligations hereunder without the prior written consent of the Investor, including by merger or consolidation. The Investor may not assign its rights or obligations under this Agreement.

(h) No Third Party Beneficiaries. This Agreement is intended for the benefit of the parties hereto and their respective permitted successors and assigns, and is not for the benefit of, nor may any provision hereof be enforced by, any other Person.

(i) Publicity. The Company shall afford the Investor and its counsel with the opportunity to review and comment upon, shall consult with the Investor and its counsel on the form and substance of, and shall give due consideration to all such comments from the Investor or its counsel on, the Prospectus Supplement, any press release or any Current Report on Form 8-K by or on behalf of the Company relating to the Investor, its purchases hereunder or any aspect to the Transaction Documents or the transactions contemplated thereby, not less than 24 hours prior to the issuance, filing or public disclosure thereof. The Investor must be provided with a final version of any such press release or SEC filing at least 24 hours prior to any release, filing or use by the Company thereof.

(j) Further Assurances. Each party shall do and perform, or cause to be done and performed, all such further acts and things, and shall execute and deliver all such other agreements, certificates, instruments and documents, as the other party may reasonably request in order to consummate and make effective, as soon as reasonably possible, the Commencement, and to carry out the intent and accomplish the purposes of this Agreement and the consummation of the transactions contemplated hereby.

(k) No Financial Advisor, Placement Agent, Broker or Finder. The Company represents and warrants to the Investor that it has not engaged any financial advisor, placement agent, broker or finder in connection with the transactions contemplated hereby. The Investor represents and warrants to the Company that it has not engaged any financial advisor, placement agent, broker or finder in connection with the transactions contemplated hereby. The Company shall be responsible for the payment of any fees or commissions, if any, of any financial advisor, placement agent, broker or finder relating to or arising out of the transactions contemplated hereby. The Company shall pay, and hold the Investor harmless against, any liability, loss or expense (including, without limitation, reasonable attorneys' fees and out of pocket expenses) arising in connection with any such claim made by a third party for any such fees or commissions.

(l) No Strict Construction. The language used in this Agreement will be deemed to be the language chosen by the parties to express their mutual intent, and no rules of strict construction will be applied against any party.

(m) Remedies, Other Obligations, Breaches and Injunctive Relief. The Investor's remedies provided in this Agreement, including, without limitation, the Investor's remedies provided in Section 9, shall be cumulative and in addition to all other remedies available to the Investor under this Agreement, at law or in equity (including a decree of specific performance and/or other injunctive relief). No remedy of the Investor contained herein shall be deemed a waiver of compliance with the provisions giving rise to such remedy and nothing herein shall limit the Investor's right to pursue actual damages for any failure by the Company to comply with the terms of this Agreement. The Company acknowledges that a breach by it of its obligations hereunder will cause irreparable harm to the Investor and that the remedy at law for any such breach may be inadequate. The Company therefore agrees that, in the event of any such breach or threatened breach, the Investor shall be entitled, in addition to all other available remedies, to an injunction restraining any breach, without the necessity of showing economic loss and without any bond or other security being required.

(n) Enforcement Costs. If: (i) this Agreement is placed by the Investor in the hands of an attorney for enforcement or is enforced by the Investor through any legal proceeding; (ii) an attorney is retained to represent the Investor in any bankruptcy, reorganization, receivership or other proceedings affecting creditors' rights and involving a claim under this Agreement; or (iii) subject to Section 9, an attorney is retained to represent the Investor in any other proceedings whatsoever in connection with this Agreement, then the Company shall pay to the Investor, as incurred by the Investor, all reasonable costs and expenses including attorneys' fees incurred in connection therewith, in addition to all other amounts due hereunder.

(o) Amendment and Waiver; Failure or Indulgence Not Waiver. No provision of this Agreement (i) may be amended other than by a written instrument signed by both parties hereto and (ii) may be waived other than in a written instrument signed by the party against whom enforcement of such waiver is sought. No failure or delay in the exercise of any power, right or privilege hereunder shall

operate as a waiver thereof, nor shall any single or partial exercise of any such power, right or privilege preclude other or further exercise thereof or of any other right, power or privilege.

\* \* \* \* \*

IN WITNESS WHEREOF, the Investor and the Company have caused this Purchase Agreement to be duly executed as of the date first written above.

**THE COMPANY:**

**X4 PHARMACEUTICALS, INC.**

By:       /s/ Adam S. Mostafa        
Name: Adam Mostafa

Title: Chief Financial Officer

**INVESTOR:**

**LINCOLN PARK CAPITAL FUND, LLC  
BY: LINCOLN PARK CAPITAL, LLC  
BY: ALEX NOAH INVESTORS, INC.**

By:       /s/ Jonathan Cope        
Name: Jonathan Cope  
Title: President

## EXHIBITS

- Exhibit A Form of Officer's Certificate
- Exhibit B Form of Resolutions of the Board of Directors of the Company Pertaining to the Transaction
- Exhibit C Form of Secretary's Certificate



## REGISTRATION RIGHTS AGREEMENT

**THIS REGISTRATION RIGHTS AGREEMENT** (this “Agreement”), dated as of January 14, 2022, is entered into by and between **X4 PHARMACEUTICALS, INC.**, a Delaware corporation (the “Company”), and **LINCOLN PARK CAPITAL FUND, LLC**, an Illinois limited liability company (together with its permitted assigns, the “Investor”). Capitalized terms used herein and not otherwise defined herein shall have the respective meanings set forth in the Purchase Agreement by and between the parties hereto, dated as of the date hereof (as amended, restated, supplemented or otherwise modified from time to time, the “Purchase Agreement”).

### WHEREAS:

A. Upon the terms and subject to the conditions of the Purchase Agreement, (i) the Company has agreed to issue to the Investor, and the Investor has agreed to purchase the Purchase Shares, and (ii) the Company has agreed to issue to the Investor the Commitment Shares; and

B. To induce the Investor to enter into the Purchase Agreement, the Company has agreed to provide certain registration rights under the Securities Act, and applicable state securities laws.

**NOW, THEREFORE**, in consideration of the promises and the mutual covenants contained herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Company and the Investor hereby agree as follows:

### 1. DEFINITIONS.

For purposes of this Agreement, the following terms shall have the following meanings:

(a) “Register,” “Registered,” and “Registration” refer to a registration effected by preparing and filing one or more registration statements of the Company in compliance with the Securities Act pursuant to Rule 415 under the Securities Act or any successor rule and providing for offering securities on a continuous basis, and the declaration or ordering of effectiveness of such registration statement(s) by the SEC.

(b) “Registrable Securities” means the Purchase Shares that may from time to time be issued or issuable to the Investor upon purchases of the Available Amount under the Purchase Agreement (without regard to any limitation or restriction on purchases), the Commitment Shares issued or issuable to the Investor, and any Common Stock issued or issuable with respect to the Purchase Shares, the Commitment Shares or the Purchase Agreement as a result of any stock split, stock dividend, recapitalization, exchange or similar event, without regard to any limitation on purchases under the Purchase Agreement.

(c) “Registration Statement” means the Shelf Registration Statement and any other registration statement of the Company that Registers Registrable Securities, including a New Registration Statement, as amended when each became effective, including all documents filed as part thereof or incorporated by reference therein, and including any information contained in a Prospectus subsequently filed with the SEC.

(d) “Shelf Registration Statement” means the Company’s existing registration statement on Form S-3 (File No. 333-242372).

### 2. REGISTRATION.

(a) Mandatory Registration. The Company agrees that it shall, within the time required under Rule 424(b) under the Securities Act, file with the SEC the Initial Prospectus Supplement pursuant to Rule 424(b) under the Securities Act specifically relating to the transactions contemplated by, and describing the material terms and conditions of, the Transaction Documents, containing information previously omitted at the time of effectiveness of the Registration Statement in reliance on Rule 430B

under the Securities Act, and disclosing all information relating to the transactions contemplated hereby required to be disclosed in the Registration Statement and the Prospectus as of the date of the Initial Prospectus Supplement, including, without limitation, information required to be disclosed in the section captioned "Plan of Distribution" in the Prospectus. The Investor acknowledges that it will be identified in the Initial Prospectus Supplement as an underwriter within the meaning of Section 2(a)(11) of the Securities Act. The Company shall permit the Investor to review and comment upon the Initial Prospectus Supplement at least two (2) Business Days prior to its filing with the SEC, the Company shall give due consideration to all such comments, and the Company shall not file the Initial Prospectus Supplement with the SEC in a form to which the Investor reasonably objects. The Investor shall use its reasonable best efforts to comment upon the Initial Prospectus Supplement within one (1) Business Day from the date the Investor receives a substantially complete draft thereof from the Company. The Investor shall furnish to the Company such information regarding itself, the Securities held by it and the intended method of distribution thereof, including any arrangement between the Investor and any other Person relating to the sale or distribution of the Securities, as shall be reasonably requested by the Company in connection with the preparation and filing of the Initial Prospectus Supplement, and shall otherwise cooperate with the Company as reasonably requested by the Company in connection with the preparation and filing of the Initial Prospectus Supplement with the SEC.

(b) Effectiveness. The Company shall use its commercially reasonable efforts to keep the Registration Statement effective pursuant to Rule 415 promulgated under the Securities Act, and to keep the Registration Statement and the Prospectus current and available for issuances and sales of all possible Registrable Securities by the Company to the Investor, and for the resale of all of the Registrable Securities by the Investor, at all times until the earliest of (i) the date on which Company no longer qualifies to make sales under the Registration Statement (which shall be understood to include the inability of the Company to immediately register sales of Registrable Securities to the Investor under the Shelf Registration Statement or any New Registration Statement pursuant to General Instruction I.B.6 of Form S-3), (ii) the date on which the Investor shall have sold all the Securities and no Available Amount remains under this Agreement and (iii) 180 days following the earlier of termination of this Agreement and the Maturity Date (the "Registration Period"). Without limiting the generality of the foregoing, during the Registration Period, the Company shall (a) take all action reasonably necessary to cause the Common Stock to continue to be Registered as a class of securities under Section 12(b) of the Exchange Act and shall not take any action or file any document (whether or not permitted by the Exchange Act) to terminate or suspend such registration and (b) file or furnish on or before their respective due dates all reports and other documents required to be filed or furnished by the Company pursuant to Sections 13(a), 13(c), 14, 15(d) or any other provision of or under the Exchange Act, and shall not take any action or file any document (whether or not permitted by the Exchange Act) to terminate or suspend its reporting and filing obligations under the Exchange Act. The Registration Statement (including any amendments or supplements thereto and prospectuses contained therein) shall not contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein, in light of the circumstances under which they were made, not misleading.

(c) Prospectus Amendments or Supplements. Except as provided in this Agreement and other than periodic and current reports required to be filed pursuant to the Exchange Act, the Company shall not file with the SEC any amendment to the Registration Statement or any supplement to the Base Prospectus that refers to the Investor, the Transaction Documents or the transactions contemplated thereby (including, without limitation, any Prospectus Supplement filed in connection with the transactions contemplated by the Transaction Documents), in each case with respect to which (a) the Investor shall not previously have been advised and afforded the opportunity to review and comment thereon at least two (2) Business Days prior to filing with the SEC, as the case may be, (b) the Company shall not have given due consideration to any comments thereon received from the Investor or its counsel, or (c) the Investor shall reasonably object, unless the Company reasonably has determined that it is necessary to amend the Registration Statement or make any supplement to the Prospectus to comply with the Securities Act or any other applicable law or regulation, in which case (i) the Company shall promptly (but in no event later than 24 hours) so inform the Investor, (ii) the Investor shall be provided with a reasonable opportunity to review and comment upon any disclosure referring to the Investor, the Transaction Documents or the transactions contemplated thereby, as applicable, and (iii) the Company shall expeditiously furnish to the Investor a copy thereof. In addition, for so long as, in the reasonable opinion of counsel for the Investor, the Prospectus is required to be delivered in connection with any

acquisition or sale of Securities by the Investor, the Company shall not file any Prospectus Supplement with respect to the Securities without furnishing to the Investor as many copies of such Prospectus Supplement, together with the Prospectus, as the Investor may reasonably request.

(d) Sufficient Number of Shares Registered. In the event the number of shares available under the Shelf Registration Statement at any time is insufficient to cover the Registrable Securities, the Company shall, to the extent necessary and permissible, amend the Shelf Registration Statement or file a new registration statement (together with any prospectuses or prospectus supplements thereunder, a “New Registration Statement”), so as to cover all of such Registrable Securities as soon as reasonably practicable, but in any event not later than ten (10) Business Days after the necessity therefor arises. The Company shall use its reasonable best efforts to have such amendment and/or New Registration Statement become effective as soon as reasonably practicable following the filing thereof. In addition, in the event the Company has filed a New Registration Statement that has been declared effective by the SEC, such New Registration Statement may replace the Shelf Registration Statement and cover the Registrable Securities upon the filing of a prospectus supplement relating thereto covering the Registrable Securities, provided the Investor and its counsel shall have had a reasonable opportunity to review and comment upon such prospectus supplement prior to its filing with the SEC.

(e) Offering. If the SEC seeks to characterize any offering pursuant to a Registration Statement filed pursuant to this Agreement as constituting an offering of securities that does not permit such Registration Statement to become effective and be used by the Investor under Rule 415 at then-prevailing market prices (and not fixed prices), or if after the filing of the Initial Prospectus Supplement with the SEC pursuant to Section 2(a), the Company is otherwise required by the Staff or the SEC to reduce the number of Registrable Securities included in such initial Registration Statement, then the Company shall reduce the number of Registrable Securities to be included in such initial Registration Statement (with the prior consent, which shall not be unreasonably withheld, of the Investor as to the specific Registrable Securities to be removed therefrom) until such time as the SEC shall so permit such Registration Statement to become effective and be used as aforesaid. In the event of any reduction in Registrable Securities pursuant to this paragraph, the Company shall file one or more New Registration Statements in accordance with Section 2(d) until such time as all Registrable Securities have been included in Registration Statements that have been declared effective and the prospectuses contained therein is available for use by the Investor.

### 3. RELATED OBLIGATIONS.

With respect to the Registration Statement and whenever any Registrable Securities are to be Registered pursuant to Section 2, including on the Shelf Registration Statement or on any New Registration Statement, the Company shall use its reasonable best efforts to effect the registration of the Registrable Securities in accordance with the intended method of disposition thereof and, pursuant thereto, the Company shall have the following obligations:

(a) Notifications. The Company will notify the Investor promptly of the time when any subsequent amendment to the Shelf Registration Statement or any New Registration Statement, other than documents incorporated by reference, has been filed with the SEC and/or has become effective or where a receipt has been issued therefor or any subsequent supplement to a Prospectus relating to the Registrable Securities has been filed and of any request by the SEC for any amendment or supplement to the Registration Statement, any New Registration Statement or any Prospectus or for additional information, in each case applicable to the Registrable Securities.

(b) Amendments. The Company will prepare and file with the SEC, promptly upon the Investor’s request, any amendments or supplements to the Shelf Registration Statement, any New Registration Statement or any Prospectus, as applicable, that, in the reasonable opinion of the Investor and the Company, may be necessary or advisable in connection with any acquisition or sale of Registrable Securities by the Investor (provided, however, that the failure of the Investor to make such request shall not relieve the Company of any obligation or liability hereunder).

(c) Investor Review. The Company will not file any amendment or supplement to the Registration Statement, any New Registration Statement or any Prospectus, other than documents

incorporated by reference, relating to the Investor, the Registrable Securities or the transactions contemplated hereby unless (A) the Investor shall have been advised and afforded the opportunity to review and comment thereon at least two (2) Business Days prior to filing with the SEC, (B) the Company shall have given due consideration to any comments thereon received from the Investor or its counsel, and (C) the Investor has not reasonably objected thereto (provided, however, that the failure of the Investor to make such objection shall not relieve the Company of any obligation or liability hereunder), and the Company will furnish to the Investor at the time of filing thereof a copy of any document that upon filing is deemed to be incorporated by reference into the Registration Statement or any Prospectus, except for those documents available via EDGAR.

(d) Form S-3. The Company will cause each amendment or supplement to the Prospectus, other than documents incorporated by reference, to be filed with the SEC as required pursuant to the rules of Form S-3.

(e) Copies Available. The Company will furnish to the Investor and its counsel (at the expense of the Company) copies of the Registration Statement, the Prospectus (including all documents incorporated by reference therein), any Prospectus Supplement, any New Registration Statement and all amendments and supplements to the Registration Statement, the Prospectus or any New Registration Statement that are filed with the SEC during the Registration Period (including all documents filed with or furnished to the SEC during such period that are deemed to be incorporated by reference therein), in each case as soon as reasonably practicable upon the Investor's request and in such quantities as the Investor may from time to time reasonably request and, at the Investor's request, will also furnish copies of the Prospectus to each exchange or market on which sales of the Registrable Securities may be made; provided, however, that the Company shall not be required to furnish any document (other than the Prospectus) to the Investor to the extent such document is available on EDGAR.

(f) Qualification. The Company shall take all such action, if any, as is reasonably necessary in order to obtain an exemption for or to qualify (i) the issuance of the Commitment Shares and the sale of the Purchase Shares to the Investor under this Agreement and (ii) any subsequent resale of all Commitment Shares and all Purchase Shares by the Investor, in each case, under applicable securities or "Blue Sky" laws of the states of the United States in such states as is reasonably requested by the Investor during the Registration Period, and shall provide evidence of any such action so taken to the Investor. During the Registration Period, the Company shall promptly notify the Investor of the receipt by the Company of any notification with respect to the suspension of the registration or qualification of any of the Registrable Securities for sale under the securities or "Blue Sky" laws of any jurisdiction in the United States or its receipt of actual notice of the initiation or threat of any proceeding for such purpose.

(g) Notification of Stop Orders; Material Changes. The Company shall advise the Investor promptly (but in no event later than 24 hours) and shall confirm such advice in writing, in each case: (i) of the Company's receipt of notice of any request by the SEC or any other federal or state governmental authority for amendment of or a supplement to the Registration Statement or any Prospectus or for any additional information; (ii) of the Company's receipt of notice of the issuance by the SEC or any other federal or state governmental authority of any stop order suspending the effectiveness of the Registration Statement or prohibiting or suspending the use of the Prospectus or Prospectus Supplement, or any New Registration Statement, or of the Company's receipt of any notification of the suspension of qualification of the Registrable Securities for offering or sale in any jurisdiction or the initiation or contemplated initiation of any proceeding for such purpose; and (iii) of the Company becoming aware of the happening of any event, which makes any statement of a material fact made in the Registration Statement or any Prospectus untrue or which requires the making of any additions to or changes to the statements then made in the Registration Statement or any Prospectus in order to state a material fact required by the Securities Act to be stated therein or necessary in order to make the statements then made therein (in the case of any Prospectus, in light of the circumstances under which they were made) not misleading, or of the necessity to amend the Registration Statement or any Prospectus to comply with the Securities Act or any other law. The Company shall not be required to disclose to the Investor the substance of specific reasons of any of the events set forth in clause (i) through (iii) of the immediately preceding sentence, but rather, shall only be required to disclose that the event has occurred. If at any time the SEC, or any other federal or state governmental authority shall issue any stop order suspending the effectiveness of the Registration Statement or prohibiting or suspending the

use of the Prospectus or Prospectus Supplement, the Company shall use its reasonable best efforts to obtain the withdrawal of such order at the earliest practicable time. The Company shall furnish to the Investor, without charge, a copy of any correspondence from the SEC or the staff of the SEC, or any other federal or state governmental authority to the Company or its representatives relating to the Shelf Registration Statement, any New Registration Statement or any Prospectus, or Prospectus Supplement as the case may be. The Company shall not deliver to the Investor any Regular Purchase Notice, Accelerated Purchase Notice or Additional Accelerated Purchase Notice, and the Investor shall not be obligated to purchase any shares of Common Stock under the Purchase Agreement, during the continuation or pendency of any of the foregoing events. If at any time the SEC shall issue any stop order suspending the effectiveness of the Registration Statement or prohibiting or suspending the use of the Prospectus or any Prospectus Supplement, the Company shall use its reasonable best efforts to obtain the withdrawal of such order at the earliest practicable time. The Company shall furnish to the Investor, without charge, a copy of any correspondence from the SEC or the staff of the SEC to the Company or its representatives relating to the Registration Statement or the Prospectus, as the case may be.

(h) Listing on the Principal Market. The Company shall promptly secure the listing, or conditional listing as applicable, of all of the Purchase Shares and Commitment Shares to be issued to the Investor hereunder on the Principal Market (subject to standard listing conditions, if any, for transactions of this nature, official notice of issuance and the Exchange Cap) and upon each other national securities exchange or automated quotation system, if any, upon which the Common Stock are then listed, and shall maintain, so long as any Common Stock shall be so listed, such listing of all such Registrable Securities from time to time issuable hereunder. The Company shall use its commercially reasonable efforts to maintain the listing of the Common Stock on the Principal Market and shall comply in all respects with the Company's reporting, filing and other obligations under the bylaws or rules and regulations of the Principal Market. The Company shall not take any action that would reasonably be expected to result in the delisting or suspension of the Common Stock on the Principal Market. The Company shall promptly provide to the Investor copies of any notices it receives from any Person regarding the continued eligibility of the Common Stock for listing on the Principal Market; provided, however, that the Company shall not provide the Investor copies of any such notice that the Company reasonably believes constitutes material non-public information and that the Company would not be required to publicly disclose such notice in any report or statement filed with the SEC under the Exchange Act (including on Form 8-K) or the Securities Act. The Company shall pay all fees and expenses in connection with satisfying its obligations under this Section 3(h).

(i) Delivery of Shares. The Company shall cooperate with the Investor to facilitate the timely preparation and delivery of DWAC Shares (not bearing any restrictive legend) representing the Registrable Securities to be offered pursuant to the Shelf Registration Statement or any New Registration Statement and enable such DWAC Shares to be in such denominations or amounts as the Investor may reasonably request and registered in such names as the Investor may request.

(j) Transfer Agent. The Company shall at all times maintain the services of the Transfer Agent or a successor transfer agent with respect to its Common Stock.

(k) Approvals. The Company shall use its reasonable best efforts to cause the Registrable Securities covered by any Registration Statement to be Registered with or approved by such other governmental agencies or authorities in the United States as may be necessary to consummate the disposition of such Registrable Securities.

(l) Confirmation of Effectiveness. If reasonably requested by the Investor at any time, the Company shall deliver to the Investor a written confirmation from Company's counsel of whether or not the effectiveness of such Registration Statement has lapsed at any time for any reason (including, without limitation, the issuance of a stop order) and whether or not the Registration Statement is currently effective and available to the Company for sale of all of the Registrable Securities.

(m) Further Assurances. The Company agrees to take all other reasonable actions as necessary and reasonably requested by the Investor to expedite and facilitate disposition by the Investor of Registrable Securities pursuant to any Registration Statement.

(n) Suspension of Sales. The Investor agrees that, upon receipt of any notice from the Company of the existence of any suspension or stop order as set forth in Section 3(f) or 3(g), the Investor will immediately discontinue disposition of Registrable Securities pursuant to any Registration Statement covering such Registrable Securities until the Investor's receipt of the copies of a notice regarding the resolution or withdrawal of the suspension or stop order as contemplated by Section 3(f) or 3(g). Notwithstanding anything to the contrary, the Company shall cause its transfer agent to promptly deliver to the Investor DWAC Shares without any restrictive legend in accordance with the terms of the Purchase Agreement in connection with any sale of Registrable Securities with respect to which the Investor has entered into a contract for sale prior to the Investor's receipt of a notice from the Company of the happening of any event of the kind described in Section 3(f) or 3(g) and for which the Investor has not yet settled.

(o) Transfer Agent Instructions. On or before the date the Registration Statement is declared effective by the SEC, the Company shall issue to the Transfer Agent the Commencement Irrevocable Transfer Agent Instructions in the form agreed to prior to the date hereof, and on the date any Registration Statement which includes the Registrable Securities is ordered effective by the SEC, the Company shall deliver, or shall cause legal counsel for the Company to deliver, to the Transfer Agent for such Registrable Securities (with copies to the Investor) confirmation that such Registration Statement has been declared effective by the SEC in the form attached as an exhibit to the Commencement Irrevocable Transfer Agent Instructions. Thereafter, if reasonably requested by the Investor at any time, the Company shall require its legal counsel to deliver to the Investor a written confirmation whether or not the effectiveness of such Registration Statement has lapsed at any time for any reason (including, without limitation, the issuance of a stop order) and whether or not the Registration Statement is current and available to the Investor for sale of all of the Registrable Securities.

#### **4. OBLIGATIONS OF THE INVESTOR.**

(a) Investor Information. The Investor has furnished to the Company in Exhibit A hereto such information regarding itself, the Registrable Securities held by it, and the intended method of disposition thereof, including any arrangement between the Investor and any other Person relating to the sale or distribution of the Securities, as required to effect the registration of such Registrable Securities and shall execute such documents in connection with such registration as the Company may reasonably request. The Company shall notify the Investor in writing of any other information the Company reasonably requires from the Investor in connection with any Registration Statement hereunder, and the Investor shall promptly furnish such information to the Company. The Investor will as promptly as practicable notify the Company of any material change in the information set forth in Exhibit A, other than changes in its ownership of Common Stock.

(b) Investor Cooperation. The Investor agrees to cooperate with the Company as reasonably requested by the Company in connection with the preparation and filing of any amendments and supplements to any Registration Statement or New Registration Statement hereunder.

#### **5. EXPENSES OF REGISTRATION.**

All reasonable expenses of the Company, other than sales or brokerage commissions and fees and disbursements of counsel for, and other expenses of, the Investor, incurred in connection with registrations, filings or qualifications pursuant to Sections 2 and 3, including, without limitation, all registration, listing and qualifications fees, printers and accounting fees, and fees and disbursements of counsel for the Company, shall be paid by the Company; *provided that*, the amount payable by the Company with respect to expenses incurred by the Investor in connection with the transactions contemplated by the Transaction Documents, including, but not limited to, fees and disbursements of counsel for the Investor, shall not exceed the amount paid by the Company as of the date hereof.

#### **6. INDEMNIFICATION.**

(a) To the fullest extent permitted by law, the Company will, and hereby does, indemnify, hold harmless and defend the Investor, each Person, if any, who controls the Investor, the directors, officers, partners, employees, members, managers, agents, representatives of the Investor and

each Person, if any, who controls the Investor within the meaning of the Securities Act or the Exchange Act (each, an “Indemnified Person”), against any losses, claims, damages, liabilities, judgments, fines, penalties, charges, costs, reasonable and documented attorneys’ fees, amounts paid in settlement (with the prior consent of the Company, such consent not to be unreasonably withheld) or reasonable and documented expenses, (collectively, “Claims”) reasonably incurred in investigating, preparing or defending any action, claim, suit, inquiry, proceeding, investigation or appeal taken from the foregoing by or before any court or governmental, administrative or other regulatory agency or body or the SEC, whether pending or threatened, whether or not an indemnified party is or may be a party thereto (“Indemnified Damages”), to which any of them may become subject insofar as such Claims (or actions or proceedings, whether commenced or threatened, in respect thereof) arise out of or are based upon: (i) any untrue statement or alleged untrue statement of a material fact in the Registration Statement, any New Registration Statement or any post-effective amendment thereto or in any filing made in connection with the qualification of the offering under the securities or other “blue sky” laws of any jurisdiction in which Registrable Securities are offered (“Blue Sky Filing”), or the omission or alleged omission to state a material fact required to be stated therein or necessary to make the statements therein not misleading, (ii) any untrue statement or alleged untrue statement of a material fact contained in the final Prospectus or the omission or alleged omission to state therein any material fact necessary to make the statements made therein, in light of the circumstances under which the statements therein were made, not misleading, (iii) any violation or alleged violation by the Company of the Securities Act, the Exchange Act, any other law, including, without limitation, any state securities law, or any rule or regulation thereunder relating to the offer or sale of the Registrable Securities pursuant to the Registration Statement or any New Registration Statement or (iv) any material violation by the Company of this Agreement (the matters in the foregoing clauses (i) through (iv) being, collectively, “Violations”). The Company shall reimburse each Indemnified Person promptly within 30 days of receipt of written notice of such expenses, for any reasonable out-of-pocket legal fees or other reasonable and documented expenses incurred by them in connection with investigating or defending any such Claim. Notwithstanding anything to the contrary contained herein, the indemnification agreement contained in this Section 6(a): (A) shall not apply to a Claim by an Indemnified Person arising out of or based upon a Violation which occurs in reliance upon and in conformity with information furnished in writing to the Company by the Investor or such Indemnified Person expressly for use in connection with the preparation of the Registration Statement, any New Registration Statement, the Prospectus or any such amendment thereof or supplement thereto; (B) with respect to any superseded prospectus, shall not inure to the benefit of any such Person from whom the Person asserting any such Claim purchased the Registrable Securities that are the subject thereof (or to the benefit of any other Indemnified Person) if the untrue statement or omission of material fact contained in the superseded prospectus was corrected in the revised prospectus, as then amended or supplemented, if such revised prospectus was timely made available by the Company pursuant to Section 3(c) or Section 3(e), and the Indemnified Person was promptly advised in writing not to use the incorrect prospectus prior to the use giving rise to a violation; (C) shall not be available to the extent such Claim is based on a failure of the Investor to deliver, or to cause to be delivered, the prospectus made available by the Company, if such prospectus was theretofore made available by the Company pursuant to Section 3(c) or Section 3(e); and (D) shall not apply to amounts paid in settlement of any Claim if such settlement is effected without the prior written consent of the Company, which consent shall not be unreasonably withheld. Such indemnity shall remain in full force and effect regardless of any investigation made by or on behalf of the Indemnified Person and shall survive the transfer of the Registrable Securities by the Investor pursuant to Section 8.

(b) In connection with the Registration Statement, any New Registration Statement or Prospectus, the Investor agrees to indemnify, hold harmless and defend, to the same extent and in the same manner as is set forth in Section 6(a), the Company, each of its directors, each of its officers who signed the Shelf Registration Statement or signs any New Registration Statement, each Person, if any, who controls the Company within the meaning of the Securities Act or the Exchange Act (collectively and together with an Indemnified Person, an “Indemnified Party”), against any Claim or Indemnified Damages to which any of them may become subject, under the Securities Act, the Exchange Act or otherwise, insofar as such Claim or Indemnified Damages arise out of or are based upon any Violation, in each case to the extent that such Violation occurs in reliance upon and in conformity with written information about the Investor set forth on Exhibit A attached hereto or updated from time to time in writing by the Investor and furnished to the Company by the Investor expressly for inclusion in the Shelf Registration Statement or Prospectus or any New Registration Statement or from the failure of the

Investor to deliver or to cause to be delivered the prospectus made available by the Company, if such prospectus was timely made available by the Company pursuant to Section 3(c) or Section 3(e); and, subject to Section 6(d), the Investor will reimburse any reasonable out-of-pocket legal or other documented expenses reasonably incurred by them in connection with investigating or defending any such Claim; provided, however, that the indemnity agreement contained in this Section 6(b) and the agreement with respect to contribution contained in Section 7 shall not apply to amounts paid in settlement of any Claim if such settlement is effected without the prior written consent of the Investor, which consent shall not be unreasonably withheld; provided, further, however, that the Investor shall be liable under this Section 6(b) for only that amount of a Claim or Indemnified Damages as does not exceed the net proceeds to the Investor as a result of the sale of Registrable Securities pursuant to such Registration Statement. Such indemnity shall remain in full force and effect regardless of any investigation made by or on behalf of such Indemnified Party and shall survive the transfer of the Registrable Securities by the Investor pursuant to Section 8.

(c) Promptly after receipt by an Indemnified Person or Indemnified Party under this Section 6 of notice of the commencement of any action or proceeding (including any governmental action or proceeding) involving a Claim, such Indemnified Person or Indemnified Party shall, if a Claim in respect thereof is to be made against any indemnifying party under this Section 6, deliver to the indemnifying party a written notice of the commencement thereof, and the indemnifying party shall have the right to participate in, and, to the extent the indemnifying party so desires, jointly with any other indemnifying party similarly noticed, to assume control of the defense thereof with counsel mutually satisfactory to the indemnifying party and the Indemnified Person or the Indemnified Party, as the case may be, and upon such notice, the indemnifying party shall not be liable to the Indemnified Person or Indemnified Party for any legal or other expenses subsequently incurred by the Indemnified Person or Indemnified Party in connection with the defense thereof; provided, however, that an Indemnified Person or Indemnified Party (together with all other Indemnified Persons and Indemnified Parties that may be represented without conflict by one counsel) shall have the right to retain its own counsel with the reasonable fees and expenses to be paid by the indemnifying party, if, in the reasonable opinion of counsel retained by the indemnifying party, the representation by such counsel of the Indemnified Person or Indemnified Party and the indemnifying party would be inappropriate due to actual or potential differing interests between such Indemnified Person or Indemnified Party and any other party represented by such counsel in such proceeding. The Indemnified Party or Indemnified Person shall cooperate with the indemnifying party in connection with any negotiation or defense of any such action or claim by the indemnifying party and shall furnish to the indemnifying party all information reasonably available to the Indemnified Party or Indemnified Person which relates to such action or claim. The indemnifying party shall keep the Indemnified Party or Indemnified Person fully apprised as to the status of the defense or any settlement negotiations with respect thereto. No indemnifying party shall be liable for any settlement of any action, claim or proceeding effected without its written consent, provided, however, that the indemnifying party shall not unreasonably withhold, delay or condition its consent. No indemnifying party shall, without the consent of the Indemnified Party or Indemnified Person, consent to entry of any judgment or enter into any settlement or other compromise which does not include as an unconditional term thereof the giving by the claimant or plaintiff to such Indemnified Party or Indemnified Person of a release from all liability in respect to such claim or litigation. Following indemnification as provided for hereunder, the indemnifying party shall be subrogated to all rights of the Indemnified Party or Indemnified Person with respect to all third parties, firms or corporations relating to the matter for which indemnification has been made. The failure to deliver written notice to the indemnifying party within a reasonable time of the commencement of any such action shall not relieve such indemnifying party of any liability to the Indemnified Person or Indemnified Party under this Section 6, except to the extent that the indemnifying party is prejudiced in its ability to defend such action.

(d) The indemnification required by this Section 6 shall be made by periodic payments of the amount thereof during the course of the investigation or defense, in each case, within 30 days of receipt of written notice of such bills or expenses. Any Person receiving a payment pursuant to this Section 6 which person is later determined to not be entitled to such payment shall return such payment (including reimbursement of expenses) to the person making it.



(e) The indemnity agreements contained herein shall be in addition to (i) any cause of action or similar right of the Indemnified Party or Indemnified Person against the indemnifying party or others, and (ii) any liabilities the indemnifying party may be subject to pursuant to the law.

#### **7. CONTRIBUTION.**

To the extent any indemnification by an indemnifying party is prohibited or limited by law, the indemnifying party agrees to make the maximum contribution with respect to any amounts for which it would otherwise be liable under Section 6 to the fullest extent permitted by law; provided, however, that: (i) no seller of Registrable Securities guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) shall be entitled to contribution from any seller of Registrable Securities who was not guilty of fraudulent misrepresentation; and (ii) contribution by any seller of Registrable Securities shall be limited in amount to the net amount of proceeds received by such seller from the sale of such Registrable Securities.

#### **8. ASSIGNMENT OF REGISTRATION RIGHTS.**

The Company shall not assign this Agreement or any rights or obligations hereunder without the prior written consent of the Investor; provided, however, that any transaction, whether by merger, reorganization, restructuring, consolidation, financing or otherwise, whereby the Company remains the surviving entity immediately after such transaction shall not be deemed an assignment. The Investor may not assign its rights under this Agreement without the prior written consent of the Company.

#### **9. AMENDMENT OF REGISTRATION RIGHTS.**

No provision of this Agreement may be amended or waived by the parties from and after the date that is one Business Day immediately preceding the initial filing of the Initial Prospectus Supplement with the SEC. Subject to the immediately preceding sentence, no provision of this Agreement may be (i) amended other than by a written instrument signed by both parties hereto or (ii) waived other than in a written instrument signed by the party against whom enforcement of such waiver is sought. Failure of any party to exercise any right or remedy under this Agreement or otherwise, or delay by a party in exercising such right or remedy, shall not operate as a waiver thereof.

#### **10. MISCELLANEOUS.**

(a) Notices. Any notices, consents or other communications required or permitted to be given under the terms of this Agreement must be in writing and will be deemed to have been delivered: (i) upon receipt, when delivered personally; (ii) upon receipt, when sent by facsimile (provided confirmation of transmission is mechanically or electronically generated and kept on file by the sending party); (iii) upon receipt, when sent by electronic message (provided the recipient responds to the message and confirmation of both electronic messages are kept on file by the sending party); or (iv) one (1) Business Day after timely deposit with a nationally recognized overnight delivery service, in each case properly addressed to the party to receive the same. The addresses and facsimile numbers for such communications shall be:

X4 Pharmaceuticals, Inc.  
61 N. Beacon Street  
4<sup>th</sup> Floor  
Boston, MA 02134  
Telephone: 857-529-8300  
E-mail: adam.mostafa@x4pharma.com  
Attention: Adam Mostafa, Chief Financial Officer

With a copy to (which shall not constitute notice or service of process):

Cooley LLP  
55 Hudson Yards  
New York, NY 10001

Telephone: (212)479-5000  
Facsimile: (212)479-6275  
Email: dgoldberg@cooley.com  
Attention: Daniel I. Goldberg

If to the Investor:

Lincoln Park Capital Fund, LLC  
440 North Wells, Suite 410  
Chicago, IL 60654  
Telephone: (312) 822-9300  
Facsimile: (312) 822-9301  
E-mail: jscheinfeld@lpcfunds.com/jcope@lpcfunds.com  
Attention: Josh Scheinfeld/Jonathan Cope

With a copy to (which shall not constitute notice or service of process):

K&L Gates, LLP  
200 S. Biscayne Blvd., Ste. 3900  
Miami, Florida 33131  
Telephone: (305) 539-3306  
Facsimile: (305) 358-7095  
E-mail: clayton.parker@klgates.com  
Attention: Clayton E. Parker, Esq.

or at such other address, e-mail address and/or facsimile number and/or to the attention of such other person as the recipient party has specified by written notice given to each other party at least one (1) Business Day prior to the effectiveness of such change. Written confirmation of receipt (A) given by the recipient of such notice, consent, waiver or other communication, (B) mechanically or electronically generated by the sender's facsimile machine containing the time, date, and recipient facsimile number, (C) electronically generated by the sender's electronic mail containing the time, date and recipient email address or (D) provided by a nationally recognized overnight delivery service, shall be rebuttable evidence of receipt in accordance with clause (i), (ii), (iii) or (iv) above, respectively. Any party to this Agreement may give any notice or other communication hereunder using any other means (including messenger service, ordinary mail or electronic mail), but no such notice or other communication shall be deemed to have been duly given unless it actually is received by the party for whom it is intended.

(b) No Waiver. No failure or delay in the exercise of any power, right or privilege hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any such power, right or privilege preclude other or further exercise thereof or of any other right, power or privilege.

(c) Governing Law. The corporate laws of the State of Delaware shall govern all issues concerning the relative rights of the Company and its stockholders. All questions concerning the construction, validity, enforcement and interpretation of this Agreement shall be governed by the internal laws of the State of Illinois, without giving effect to any choice of law or conflict of law provision or rule (whether of the State of Illinois or any other jurisdictions) that would cause the application of the laws of any jurisdictions other than the State of Illinois. Each party hereby irrevocably submits to the exclusive jurisdiction of the state and federal courts sitting in the County of Cook, in the State of Illinois for the adjudication of any dispute hereunder or in connection herewith or with any transaction contemplated hereby or discussed herein, and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of any such court, that such suit, action or proceeding is brought in an inconvenient forum or that the venue of such suit, action or proceeding is improper. Each party hereby irrevocably waives personal service of process and consents to process being served in any such suit, action or proceeding by mailing a copy thereof to such party at the address for such notices to it under this Agreement and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any manner permitted by law. If any provision of this Agreement shall

be invalid or unenforceable in any jurisdiction, such invalidity or unenforceability shall not affect the validity or enforceability of the remainder of this Agreement in that jurisdiction or the validity or enforceability of any provision of this Agreement in any other jurisdiction. **EACH PARTY HEREBY IRREVOCABLY WAIVES ANY RIGHT IT MAY HAVE, AND AGREES NOT TO REQUEST, A JURY TRIAL FOR THE ADJUDICATION OF ANY DISPUTE HEREUNDER OR IN CONNECTION HERewith OR ARISING OUT OF THIS AGREEMENT OR ANY TRANSACTION CONTEMPLATED HEREBY.**

(d) Integration. This Agreement, the Purchase Agreement and the other Transaction Documents constitute the entire understanding among the parties hereto with respect to the subject matter hereof and thereof. There are no restrictions, promises, warranties or undertakings, other than those set forth or referred to herein and therein. This Agreement, the Purchase Agreement and the other Transaction Documents supersede all other prior oral or written agreements between the Investor, the Company, their affiliates and persons acting on their behalf with respect to the subject matter hereof and thereof.

(e) No Third Party Benefits. Subject to the requirements of Section 8, this Agreement shall inure to the benefit of and be binding upon the permitted successors and assigns of each of the parties hereto.

(f) Headings. The headings in this Agreement are for convenience of reference and shall not form part of, or affect the interpretation of, this Agreement.

(g) Counterparts. This Agreement may be executed in two or more identical counterparts, all of which shall be considered one and the same agreement and shall become effective when counterparts have been signed by each party and delivered to the other party; provided that a facsimile or pdf (or other electronic reproduction of a) signature shall be considered due execution and shall be binding upon the signatory thereto with the same force and effect as if the signature were an original, not a facsimile or pdf (or other electronic reproduction of a) signature.

(h) Each party shall do and perform, or cause to be done and performed, all such further acts and things, and shall execute and deliver all such other agreements, certificates, instruments and documents as the other party may reasonably request in order to carry out the intent and accomplish the purposes of this Agreement and the consummation of the transactions contemplated hereby.

(i) The language used in this Agreement will be deemed to be the language chosen by the parties to express their mutual intent and no rules of strict construction will be applied against any party.

(j) This Agreement is intended for the benefit of the parties hereto and their respective permitted successors and assigns, and is not for the benefit of, nor may any provision hereof be enforced by, any other Person.

*[Signature Page Follows]*

IN WITNESS WHEREOF, the parties have caused this Registration Rights Agreement to be duly executed as of date first written above.

**THE COMPANY:**

**X4 PHARMACEUTICALS, INC.**

By:       /s/ Adam S. Mostafa        
Name: Adam Mostafa

Title: Chief Financial Officer

**INVESTOR:**

**LINCOLN PARK CAPITAL FUND, LLC  
BY: LINCOLN PARK CAPITAL, LLC  
BY: ALEX NOAH INVESTORS, INC.**

By:       /s/ Jonathan Cope        
Name: Jonathan Cope  
Title: President

**EXHIBIT A**

**Information About The Investor Furnished To The Company By The Investor  
Expressly For Use In Connection With Each Registration Statement and Prospectus**

**Information With Respect to Lincoln Park Capital**

Immediately prior to the date of the Purchase Agreement, Lincoln Park Capital Fund, LLC, beneficially owned 197,185 shares of Common Stock. Josh Scheinfeld and Jonathan Cope, the Managing Members of Lincoln Park Capital, LLC, the manager of Lincoln Park Capital Fund, LLC, are deemed to be beneficial owners of all of the Common Stock owned by Lincoln Park Capital Fund, LLC. Messrs. Cope and Scheinfeld have shared voting and investment power over the shares being offered under the prospectus supplement filed with the SEC in connection with the transactions contemplated under the Purchase Agreement. Lincoln Park Capital, LLC is not a licensed broker dealer or an affiliate of a licensed broker dealer.