

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

**SCHEDULE 13G  
(Rule 13d-102)**

INFORMATION TO BE INCLUDED IN STATEMENTS FILED PURSUANT  
TO RULES 13d-1(b), (c), AND (d) AND AMENDMENTS THERETO FILED  
PURSUANT TO RULE 13d-2(b)

(Amendment No. 4)<sup>1</sup>

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X4 Pharmaceuticals, Inc.

(Name of Issuer)

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Common Stock, par value \$0.001 per share

(Title of Class of Securities)

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98420X103

(CUSIP Number)

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December 31, 2022

(Date of Event Which Requires Filing of this Statement)

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Check the appropriate box to designate the rule pursuant to which this Schedule is filed:

- Rule 13d-1(b)
- Rule 13d-1(c)
- Rule 13d-1(d)

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<sup>1</sup> The remainder of this cover page shall be filled out for a reporting person's initial filing on this form with respect to the subject class of securities, and for any subsequent amendment containing information which would alter disclosures provided in a prior cover page.

The information required on the remainder of this cover page shall not be deemed to be "filed" for the purpose of Section 18 of the Securities Exchange Act of 1934 ("Act") or otherwise subject to the liabilities of that section of the Act but shall be subject to all other provisions of the Act (however, see the *Notes*).

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1	NAME OF REPORTING PERSON  Biotechnology Value Fund, L.P.	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION  Delaware	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER  0
	6	SHARED VOTING POWER  1,172,223 (1)
	7	SOLE DISPOSITIVE POWER  0
	8	SHARED DISPOSITIVE POWER  1,172,223 (1)
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON  1,172,223 (1)	
10	CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)  Less than 1% (1)	
12	TYPE OF REPORTING PERSON  PN	

(1) Includes 450,314 Shares (as defined below) underlying certain Class A Warrants (as defined below).

1	NAME OF REPORTING PERSON BVF I GP LLC	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION Delaware	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER 0
	6	SHARED VOTING POWER 1,172,223 (1)
	7	SOLE DISPOSITIVE POWER 0
	8	SHARED DISPOSITIVE POWER 1,172,223 (1)
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON 1,172,223 (1)	
10	CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9) Less than 1% (1)	
12	TYPE OF REPORTING PERSON OO	

(1) Includes 450,314 Shares underlying certain Class A Warrants.

1	NAME OF REPORTING PERSON  Biotechnology Value Fund II, L.P.	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION  Delaware	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER  0
	6	SHARED VOTING POWER  888,802 (1)
	7	SOLE DISPOSITIVE POWER  0
	8	SHARED DISPOSITIVE POWER  888,802 (1)
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON  888,802 (1)	
10	CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)  Less than 1% (1)	
12	TYPE OF REPORTING PERSON  PN	

(1) Includes 363,810 Shares underlying certain Class A Warrants.

1	NAME OF REPORTING PERSON  BVF II GP LLC	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION  Delaware	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER  0
	6	SHARED VOTING POWER  888,802 (1)
	7	SOLE DISPOSITIVE POWER  0
	8	SHARED DISPOSITIVE POWER  888,802 (1)
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON  888,802 (1)	
10	CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)  Less than 1% (1)	
12	TYPE OF REPORTING PERSON  PN	

(1) Includes 363,810 Shares underlying certain Class A Warrants.

1	NAME OF REPORTING PERSON  Biotechnology Value Trading Fund OS LP	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION  Cayman Islands	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER  0
	6	SHARED VOTING POWER  148,010 (1)
	7	SOLE DISPOSITIVE POWER  0
	8	SHARED DISPOSITIVE POWER  148,010 (1)
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON  148,010 (1)	
10	CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)  Less than 1% (1)	
12	TYPE OF REPORTING PERSON  PN	

(1) Includes 64,996 Shares underlying certain Class A Warrants.

1	NAME OF REPORTING PERSON  BVF Partners OS Ltd.	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION  Cayman Islands	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER  0
	6	SHARED VOTING POWER  148,010 (1)
	7	SOLE DISPOSITIVE POWER  0
	8	SHARED DISPOSITIVE POWER  148,010 (1)
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON  148,010 (1)	
10	CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)  Less than 1% (1)	
12	TYPE OF REPORTING PERSON  CO	

(1) Includes 64,996 Shares underlying certain Class A Warrants.

1	NAME OF REPORTING PERSON  BVF GP Holdings LLC	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION  Delaware	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER  0
	6	SHARED VOTING POWER  2,061,025 (1)
	7	SOLE DISPOSITIVE POWER  0
	8	SHARED DISPOSITIVE POWER  2,061,025 (1)
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON  2,061,025 (1)	
10	CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)  1.7% (1)	
12	TYPE OF REPORTING PERSON  OO	

(1) Includes 814,124 Shares underlying certain Class A Warrants.

1	NAME OF REPORTING PERSON  BVF Partners L.P.	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION  Delaware	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER  0
	6	SHARED VOTING POWER  2,258,400 (1)
	7	SOLE DISPOSITIVE POWER  0
	8	SHARED DISPOSITIVE POWER  2,258,400 (1)
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON  2,258,400 (1)	
10	CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)  1.9% (1)	
12	TYPE OF REPORTING PERSON  PN, IA	

(1) Includes 910,750 Shares underlying certain Class A Warrants.

1	NAME OF REPORTING PERSON  BVF Inc.	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION  Delaware	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER  0
	6	SHARED VOTING POWER  2,258,400 (1)
	7	SOLE DISPOSITIVE POWER  0
	8	SHARED DISPOSITIVE POWER  2,258,400 (1)
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON  2,258,400 (1)	
10	CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)  1.9% (1)	
12	TYPE OF REPORTING PERSON  CO	

(1) Includes 910,750 Shares underlying certain Class A Warrants.

1	NAME OF REPORTING PERSON  Mark N. Lampert	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (a) <input checked="" type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION  United States	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER  0
	6	SHARED VOTING POWER  2,258,400 (1)
	7	SOLE DISPOSITIVE POWER  0
	8	SHARED DISPOSITIVE POWER  2,258,400 (1)
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON  2,258,400 (1)	
10	CHECK BOX IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)  1.9% (1)	
12	TYPE OF REPORTING PERSON  IN	

(1) Includes 910,750 Shares underlying certain Class A Warrants.

**Item 1(a). Name of Issuer:**

X4 Pharmaceuticals, Inc., a Delaware corporation (the "Issuer").

**Item 1(b). Address of Issuer's Principal Executive Offices:**

61 North Beacon Street, 4<sup>th</sup> Floor  
Boston, Massachusetts 02134

**Item 2(a). Name of Person Filing**

**Item 2(b). Address of Principal Business Office or, if None, Residence**

**Item 2(c). Citizenship**

Biotechnology Value Fund, L.P. ("BVF")  
44 Montgomery St., 40th Floor  
San Francisco, California 94104  
Citizenship: Delaware

BVF I GP LLC ("BVF GP")  
44 Montgomery St., 40th Floor  
San Francisco, California 94104  
Citizenship: Delaware

Biotechnology Value Fund II, L.P. ("BVF2")  
44 Montgomery St., 40th Floor  
San Francisco, California 94104  
Citizenship: Delaware

BVF II GP LLC ("BVF2 GP")  
44 Montgomery St., 40th Floor  
San Francisco, California 94104  
Citizenship: Delaware

Biotechnology Value Trading Fund OS LP ("Trading Fund OS")  
PO Box 309 Uglund House  
Grand Cayman, KY1-1104  
Cayman Islands  
Citizenship: Cayman Islands

BVF Partners OS Ltd. ("Partners OS")  
PO Box 309 Uglund House  
Grand Cayman, KY1-1104  
Cayman Islands  
Citizenship: Cayman Islands

BVF GP Holdings LLC ("BVF GPH")  
44 Montgomery St., 40th Floor  
San Francisco, California 94104  
Citizenship: Delaware

BVF Partners L.P. ("Partners")  
44 Montgomery St., 40th Floor  
San Francisco, California 94104  
Citizenship: Delaware

BVF Inc.  
44 Montgomery St., 40th Floor  
San Francisco, California 94104  
Citizenship: Delaware

Mark N. Lampert (“Mr. Lampert”)  
44 Montgomery St., 40th Floor  
San Francisco, California 94104  
Citizenship: United States

Each of the foregoing is referred to as a “Reporting Person” and collectively as the “Reporting Persons.”

**Item 2(d). Title of Class of Securities:**

Common Stock, par value \$0.001 per share (the “Shares”)

**Item 2(e). CUSIP Number:**

98420X103

**Item 3. If This Statement is Filed Pursuant to Rule 13d-1(b), or 13d-2(b) or (c), Check Whether the Person Filing is a:**

- |     |     |  |
|-----|-----|--|
|     | /x/ | Not applicable.  |
| (a) | //  | Broker or dealer registered under Section 15 of the Exchange Act.  |
| (b) | //  | Bank as defined in Section 3(a)(6) of the Exchange Act.  |
| (c) | //  | Insurance company as defined in Section 3(a)(19) of the Exchange Act.  |
| (d) | //  | Investment company registered under Section 8 of the Investment Company Act.   |
| (e) | //  | An investment adviser in accordance with Rule 13d-1(b)(1)(ii)(E).  |
| (f) | //  | An employee benefit plan or endowment fund in accordance with Rule 13d-1(b)(1)(ii)(F).   |
| (g) | //  | A parent holding company or control person in accordance with Rule 13d-1(b)(1)(ii)(G).   |
| (h) | //  | A savings association as defined in Section 3(b) of the Federal Deposit Insurance Act.   |
| (i) | //  | A church plan that is excluded from the definition of an investment company under Section 3(c)(14) of the Investment Company Act.  |
| (j) | //  | A non-U.S. institution in accordance with Rule 13d-1(b)(1)(ii)(J).   |
| (k) | //  | Group, in accordance with Rule 13d-1(b)(1)(ii)(K). If filing as a non-U.S. institution in accordance with Rule 13d-1(b)(1)(ii)(J), please specify the type of institution: _____ |

**Item 4. Ownership**

## (a) Amount beneficially owned:

As of the close of business on December 31, 2022, the Reporting Persons held 910,750 Class A Warrants (the “Class A Warrants”) exercisable into an aggregate of 910,750 Shares. Each Class A Warrant has an exercise price per Share equal to \$13.20 and expires on April 16, 2024. The Class A Warrants are exercisable, at the option of each holder, provided that the holder will be prohibited, subject to certain exceptions, from exercising the Class A Warrants for Shares to the extent that immediately prior to or after giving effect to such exercise, the holder, together with its affiliates and other attribution parties, would own more than 9.99% of the total number of Shares then issued and outstanding (the “Class A Blocker”). As of the close of business on December 31, 2022, the Class A Blocker does not limit the exercise of any of the Class A Warrants held by the Reporting Persons.

As of the close of business on December 31, 2022, (i) BVF beneficially owned 1,172,223 Shares, including 450,314 Shares issuable upon conversion of certain Class A Warrants held by it, (ii) BVF2 beneficially owned 888,802 Shares, including 363,810 Shares issuable upon conversion of certain Class A Warrants held by it, and (iii) Trading Fund OS beneficially owned 148,010 Shares, including 64,996 Shares issuable upon conversion of certain Class A Warrants held by it.

BVF GP, as the general partner of BVF, may be deemed to beneficially own the 1,172,223 Shares beneficially owned by BVF.

BVF2 GP, as the general partner of BVF2, may be deemed to beneficially own the 888,802 Shares beneficially owned by BVF2.

Partners OS, as the general partner of Trading Fund OS, may be deemed to beneficially own the 148,010 Shares beneficially owned by Trading Fund OS.

BVF GPH, as the sole member of each of BVF GP and BVF2 GP, may be deemed to beneficially own the 2,061,025 Shares beneficially owned in the aggregate by BVF and BVF2.

Partners, as the investment manager of BVF, BVF2 and Trading Fund OS, and the sole member of Partners OS, may be deemed to beneficially own the 2,258,400 Shares beneficially owned in the aggregate by BVF, BVF2 and Trading Fund OS and held in a certain Partners managed account (the “Partners Managed Account”), including 49,365 Shares held in the Partners Managed Account, which includes 31,630 Shares issuable upon conversion of certain Class A Warrants held in the Partners Managed Account.

BVF Inc., as the general partner of Partners, may be deemed to beneficially own the 2,258,400 Shares beneficially owned by Partners.

Mr. Lampert, as a director and officer of BVF Inc., may be deemed to beneficially own the 2,258,400 Shares beneficially owned by BVF Inc.

The foregoing should not be construed in and of itself as an admission by any Reporting Person as to beneficial ownership of any Shares owned by another Reporting Person. BVF GP disclaims beneficial ownership of the Shares beneficially owned by BVF. BVF2 GP disclaims beneficial ownership of the Shares beneficially owned by BVF2. Partners OS disclaims beneficial ownership of the Shares beneficially owned by Trading Fund OS. BVF GPH disclaims beneficial ownership of the Shares beneficially owned by BVF and BVF2. Each of Partners, BVF Inc. and Mr. Lampert disclaims beneficial ownership of the Shares beneficially owned by BVF, BVF2 and Trading Fund OS and held in the Partners Managed Account, and the filing of this statement shall not be construed as an admission that any such person or entity is the beneficial owner of any such securities.

(b) Percent of class:

The following percentages are based on a denominator that is the sum of (i) 121,034,553 Shares outstanding which is the total number of Shares outstanding as disclosed in the Issuer's Prospectus Supplement on Form 424B5 filed with the Securities and Exchange Commission on December 9, 2022 and (ii) certain or all of 910,750 Shares issuable upon the exercise of the Class A Warrants held by the Reporting Persons, as applicable.

As of the close of business on December 31, 2022, (i) BVF beneficially owned less than 1% of the outstanding Shares, (ii) BVF2 beneficially owned less than 1% of the outstanding Shares, (iii) Trading Fund OS beneficially owned less than 1% of the outstanding Shares, (iv) BVF GP may be deemed to beneficially own less than 1% of the outstanding Shares, (v) BVF2 GP may be deemed to beneficially own less than 1% of the outstanding Shares, (vi) Partners OS may be deemed to beneficially own less than 1% of the outstanding Shares, (vii) BVF GPH may be deemed to beneficially own approximately 1.7% of the outstanding Shares, and (viii) each of Partners, BVF Inc. and Mr. Lampert may be deemed to beneficially own approximately 1.9% of the outstanding Shares (less than 1% of the outstanding Shares are held in the Partners Managed Account).

(c) Number of shares as to which such person has:

(i) Sole power to vote or to direct the vote

See Cover Pages Items 5-9.

(ii) Shared power to vote or to direct the vote

See Cover Pages Items 5-9.

(iii) Sole power to dispose or to direct the disposition of

See Cover Pages Items 5-9.

(iv) Shared power to dispose or to direct the disposition of

See Cover Pages Items 5-9.

**Item 5. Ownership of Five Percent or Less of a Class.**

If this statement is being filed to report the fact that as of the date hereof the Reporting Persons have ceased to be the beneficial owner of more than five percent of the Shares, check the following [X].

**Item 6. Ownership of More than Five Percent on Behalf of Another Person.**

Not Applicable.

**Item 7. Identification and Classification of the Subsidiary That Acquired the Security Being Reported on by the Parent Holding Company or Control Person.**

Not Applicable.

**Item 8. Identification and Classification of Members of the Group.**

See Exhibit 99.1 to Amendment No. 1 to the Schedule 13G filed with the Securities and Exchange Commission on February 14, 2020.

**Item 9. Notice of Dissolution of Group.**

Not Applicable.

**Item 10. Certifications.**

By signing below each of the undersigned certifies that, to the best of its knowledge and belief, the securities referred to above were not acquired and are not held for the purpose of or with the effect of changing or influencing the control of the issuer of the securities and were not acquired and are not held in connection with or as a participant in any transaction having that purpose or effect.

SIGNATURE

After reasonable inquiry and to the best of his knowledge and belief, each of the undersigned certifies that the information set forth in this statement is true, complete and correct.

Dated: February 14, 2023

BIOTECHNOLOGY VALUE FUND, L.P.

By: BVF I GP LLC, its general partner

By: /s/ Mark N. Lampert  
Mark N. Lampert  
Chief Executive Officer

BVF I GP LLC

By: /s/ Mark N. Lampert  
Mark N. Lampert  
Chief Executive Officer

BIOTECHNOLOGY VALUE FUND II, L.P.

By: BVF II GP LLC, its general partner

By: /s/ Mark N. Lampert  
Mark N. Lampert  
Chief Executive Officer

BVF II GP LLC

By: /s/ Mark N. Lampert  
Mark N. Lampert  
Chief Executive Officer

BVF PARTNERS OS LTD.

By: BVF Partners L.P., its sole member

By: BVF Inc., its general partner

By: /s/ Mark N. Lampert  
Mark N. Lampert  
President

BIOTECHNOLOGY VALUE TRADING FUND OS LP

By: BVF Partners L.P., its investment manager

By: BVF Inc., its general partner

By: /s/ Mark N. Lampert  
Mark N. Lampert  
President

BVF GP HOLDINGS LLC

By: /s/ Mark N. Lampert  
Mark N. Lampert  
Chief Executive Officer

BVF PARTNERS L.P.

By: BVF Inc., its general partner

By: /s/ Mark N. Lampert  
Mark N. Lampert  
President

BVF INC.

By: /s/ Mark N. Lampert  
Mark N. Lampert  
President

/s/ Mark N. Lampert  
MARK N. LAMPERT