(City)

(Zip)

(State)

1. Name and Address of Reporting Person\*

## FORM 4

## UNITED STATES SECURITIES AND EXCHANGE COMMISSION

D.C. 20549

washington, D.C. 20	J

STATEMENT OF CHANGES IN BENEFICIAL OWNERS	HIP

l	OMB APPRO	DVAL
	OMB Number:	3235-0287
l	Estimated average burd	len
l	hours per response:	0.5

7. Nature of Indirect Beneficial Ownership (Instr. 4)

11. Nature of Indirect Beneficial Ownership (Instr. 4)

Check this box if no longer subject to

U obligat	ions may contir tion 1(b).			File								ies Exchan mpany Act			4			hours	per re	esponse:	0
1. Name and Address of Reporting Person*  BVF PARTNERS L P/IL  (Last) (First) (Middle)  44 MONTGOMERY ST.					2. 1													olicable)	,		ssuer
																	Offic belov	er (give title w)		Other below)	(specify
40TH FLOOR  (Street)				4.1	4. If Amendment, Date of Original Filed (Month/Day/Year)												r Joint/Group Filing (Check				
SAN FRANCISCO CA 94104			-												Forn Pers		re tha	e than One Reporting			
(City)	(St		(Zip)																		
1 Title of	Security (Inst		le I - No	n-Deri\		_		Deem		quired,	Dis	4. Securit				ally (		ed ount of	6.0	Ownership	7. Nature
I. Huc or c	Security (mai	3)		Date	Day/Year)		Execution Date, if any (Month/Day/Year		n Date,	Transa Code (			Of (D) (Instr. 3,			d 5)	Securi Benefi Owned Repor	rities ficially ed Following rted	Form: Direct (D) or Indirect (I) (Instr. 4)	m: Direct or Indirect	of Indire
						4				Code	V	Amount	(D	1	Price		(Instr.	action(s) 3 and 4)			
		001 par value <sup>(1)</sup>		_	5/2019	$\dashv$				P		853,95	_	A	\$3.1			639,935		D <sup>(2)</sup>	
		001 par value <sup>(1)</sup> 001 par value <sup>(1)</sup>			5/2019	/2019			P		689,83 124,95			\$3.1 \$3.1			955,440  28,891		D <sup>(3)</sup>		
Common	310CK, \$0.0		able II -				urit	ioc	V can		iene	osed of,		A					<u></u>	D(9	
												onvertib				y Ov	viicu				
1. Title of Derivative Security (Instr. 3)  Conversion or Exercic Price of Derivative Security		xercise (Month/Day/Year) e of vative				actio (Inst	on of		6. Date E Expiratio (Month/I	n Dat		7. Title and Amount of Securities Underlying Derivative Security (Instr. and 4)		str. 3			9. Number of derivative Securities Beneficially Owned Following Reported Transaction(s (Instr. 4)		10. Ownership Form: Direct (D) or Indirect (I) (Instr. 4)	11. Natu of Indire Benefici Ownersh (Instr. 4)	
					Code	v		(A)	(D)	Date Exercisa		Expiration Date	Title	Amo or Num of Shai	nber						
l	nd Address of	Reporting Person*																			
DVF PA	ANTINER	<u>5 L P/IL</u>				_															
(Last)	TGOMERY	(First)	(Mid	dle)																	
40TH FI		1 31.																			
(Street) SAN FR	ANCISCO	CA	941	04																	
(City)		(State)	(Zip)			_															
		Reporting Person*		O L P																	
(Last) 44 MON 40TH FI	TGOMERY	(First)  / STREET	(Mid	dle)		_															
(Street)	ANCISCO	CA	941	04																	

BIOTECHNOLOGY VALUE FUND II LP								
(Last) 44 MONTGOMER 40TH FL	(Middle)							
(Street) SAN FRANCISCO	94104							
(City)	(State)	(Zip)						
1. Name and Address of Reporting Person* <u>Biotechnology Value Trading Fund OS LP</u>								
(Last) P.O. BOX 309 UGL	(First) AND HOUSE	(Middle)						
(Street) GRAND CAYMAN	E9	KY1-1104						
(City)	(State)	(Zip)						
1. Name and Address o BVF Partners O	-							
(Last) P.O. BOX 309 UGL	(First) AND HOUSE	(Middle)						
(Street) GRAND CAYMAN	E9	KY1-1104						
(City)	(State)	(Zip)						
1. Name and Address of Reporting Person*  BVF INC/IL								
(Last) 44 MONTGOMER 40TH FL	(First) Y STREET	(Middle)						
(Street) SAN FRANCISCO	CA	94104						
(City)	(State)	(Zip)						
1. Name and Address of Reporting Person*  LAMPERT MARK N								
(Last) 44 MONTGOMER 40TH FL	(First) Y STREET	(Middle)						
(Street) SAN FRANCISCO	CA	94104						
(City)	(State)	(Zip)						

## **Explanation of Responses:**

- 1. This Form 4 is filed jointly by Biotechnology Value Fund, L.P. ("BVF"), Biotechnology Value Fund II, L.P. ("BVF2"), Biotechnology Value Trading Fund OS LP ("Trading Fund OS"), BVF Partners OS Ltd. ("Partners OS"), BVF Partners L.P. ("Partners"), BVF Inc. and Mark N. Lampert (collectively, the "Reporting Persons"). Each of the Reporting Persons is a member of a Section 13(d) group that collectively owns more than 10% of the Issuer's outstanding shares of Common Stock. Each of the Reporting Persons disclaims beneficial ownership of the securities reported herein except to the extent of his or its persons in the property of the securities reported herein except to the extent of his or its persons disclaims beneficial ownership of the securities reported herein except to the extent of his or its persons disclaims beneficial ownership of the securities reported herein except to the extent of his or its persons disclaims beneficial ownership of the securities reported herein except to the extent of his or its persons disclaims beneficial ownership of the securities reported herein except to the extent of his or its persons disclaims beneficial ownership of the securities reported herein except to the extent of his or its persons disclaims beneficial ownership of the securities reported herein except to the extent of his or its persons disclaims beneficial ownership of the securities reported herein except to the extent of his or its persons disclaims beneficial ownership of the securities reported herein except to the extent of his or its persons disclaims beneficial ownership of the securities reported herein except to the extent of his or its persons disclaims beneficial ownership of the securities are also beneficial ownership or the securities are also beneficial ownership o
- 2. Securities owned directly by BVF. As the general partner of BVF, Partners may be deemed to beneficially own the securities owned directly by BVF. As the investment adviser and general partner of Partners, BVF Inc., may be deemed to beneficially own the securities owned directly by BVF. As a director and officer of BVF Inc., Mr. Lampert may be deemed to beneficially own the securities owned directly by BVF.
- 3. Securities owned directly by BVF2. As the general partner of BVF2, Partners may be deemed to beneficially own the securities owned directly by BVF2. As the investment adviser and general partner of Partners, BVF Inc. may be deemed to beneficially own the securities owned directly by BVF2. As a director and officer of BVF Inc., Mr. Lampert may be deemed to beneficially own the securities owned directly by BVF2.
- 4. Securities owned directly by Trading Fund OS. As the general partner of Trading Fund OS, Partners OS may be deemed to beneficially own the securities owned directly by Trading Fund OS. As the investment manager of Trading Fund OS and the sole member of Partners OS, Partners may be deemed to beneficially own the securities owned directly by Trading Fund OS. As the investment adviser and general partner of Partners, BVF Inc. may be deemed to beneficially own the securities owned directly by Trading Fund OS. As a director and officer of BVF Inc., Mr. Lampert may be deemed to beneficially own the securities owned directly by Trading Fund OS.

BVF Partners L.P., By: BVF 09/09/2019 Inc., its general partner, By: /s/ Mark N. Lampert, President Biotechnology Value Fund, L.P., By: BVF Partners L.P., its general partner, By: BVF Inc., 09/09/2019 its general partner, By: /s/ Mark N. Lampert, President Biotechnology Value Fund II, L.P., By: BVF Partners L.P., its general partner, By: BVF Inc., 09/09/2019 its general partner, By: /s/ Mark N. Lampert, President BVF Partners OS Ltd., By: BVF Partners L.P., its sole member, By: BVF Inc., its 09/09/2019 general partner, By: /s/ Mark N. Lampert, President Biotechnology Value Trading Fund OS LP, By: BVF Partners L.P., its investment manager, 09/09/2019 BVF Inc., its general partner, By: /s/ Mark N. Lampert, **President** BVF Inc., By: /s/ Mark N. 09/09/2019 Lampert, President /s/ Mark N. Lampert 09/09/2019 \*\* Signature of Reporting Person

Date

Reminder: Report on a separate line for each class of securities beneficially owned directly or indirectly.

Note: File three copies of this Form, one of which must be manually signed. If space is insufficient, see Instruction 6 for procedure.

Persons who respond to the collection of information contained in this form are not required to respond unless the form displays a currently valid OMB Number.

 $<sup>^{\</sup>star}$  If the form is filed by more than one reporting person, see Instruction 4 (b)(v).

<sup>\*\*</sup> Intentional misstatements or omissions of facts constitute Federal Criminal Violations See 18 U.S.C. 1001 and 15 U.S.C. 78ff(a).