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

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**FORM S-8**  
REGISTRATION STATEMENT  
UNDER  
THE SECURITIES ACT OF 1933

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**ACELRX PHARMACEUTICALS, INC.**  
(Exact name of registrant as specified in its charter)

**Delaware**  
(State or other jurisdiction of Incorporation  
or organization)

**41-2193603**  
(I.R.S. Employer Identification No.)

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**351 Galveston Drive  
Redwood City, CA  
(650) 216-3500**  
(Address of principal executive offices) (Zip code)

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**2011 Equity Incentive Plan**  
(Full title of the plan)

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**Raffi M. Asadorian  
Chief Financial Officer  
AcelRx Pharmaceuticals, Inc.  
351 Galveston Drive  
Redwood City, CA 94063  
(650) 216-3500**  
(Name and address of agent for service) (Telephone number, including area code, of agent for service)

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Copies to:  
Mark B. Weeks  
Cooley LLP  
**3175 Hanover Street  
Palo Alto, California 94304  
(650) 843-5000**

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer

Non-accelerated filer  (Do not check if a smaller reporting company)

Accelerated filer

Smaller reporting company

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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.

**CALCULATION OF REGISTRATION FEE**

<b>Title of Securities to be Registered</b>	<b>Amount to be Registered(1)</b>	<b>Proposed Maximum Offering Price per Share(2)</b>	<b>Proposed Maximum Aggregate Offering Price(2)</b>	<b>Amount of Registration Fee</b>
Common Stock (par value \$0.001 per share)	2,035,966 shares	\$1.70	\$3,461,142	\$431

- (1) Pursuant to Rule 416(a) promulgated under the Securities Act of 1933, as amended (the "Securities Act"), this Registration Statement shall also cover any additional shares of the Registrant's Common Stock that become issuable under the plan set forth herein by reason of any stock dividend, stock split, recapitalization or other similar transaction effected without receipt of consideration that increases the number of outstanding shares of the Registrant's Common Stock.
  - (2) Estimated solely for the purpose of calculating the amount of the registration fee pursuant to Rule 457(h) and Rule 457(c) promulgated under the Securities Act. The offering price per share and the aggregate offering price are based upon the average of the high and low prices of Registrant's Common Stock as reported on the NASDAQ Global Market on March 6, 2018.
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## EXPLANATORY NOTE

This Registration Statement on Form S-8 is being filed for the purpose of registering an additional 2,035,966 shares of the common stock of AcelRx Pharmaceuticals, Inc. (the “Registrant”) to be issued pursuant to the Registrant’s 2011 Equity Incentive Plan (the “2011 Plan”).

### PART II

#### ITEM 3. INCORPORATION OF CERTAIN DOCUMENTS BY REFERENCE

The following documents filed by AcelRx Pharmaceuticals, Inc. (the “Registrant”) with the Securities and Exchange Commission are incorporated by reference into this Registration Statement:

(a) The contents of the earlier registration statement on Form S-8 relating to the 2011 Plan (File Nos. 333-209998, 333-202709, 333-194634, 333-187206, 333-180334, 333-172409 and 333-216492).

(b) The Registrant’s Annual Report on Form 10-K (the “Form 10-K”) for the year ended December 31, 2017, which includes audited financial statements for the Registrant’s latest fiscal year, filed with the SEC on March 8, 2018.

(c) The description of the Registrant’s common stock which is contained in the registration statement on Form 8-A filed on February 1, 2011, (File No. 0001-35068) under the Exchange Act of 1934, as amended (the “Exchange Act”), including any amendment or report filed for the purpose of updating such description.

(d) All other reports and documents subsequently filed by the Registrant pursuant to Sections 13(a), 13(c), 14 and 15(d) of the Exchange Act (other than Current Reports furnished under Item 2.02 or Item 7.01 of Form 8-K and exhibits furnished on such form that relate to such items) on or after the date of this Registration Statement and prior to the filing of a post-effective amendment to this Registration Statement which indicates that all securities offered have been sold or which deregisters all securities then remaining unsold, shall be deemed to be incorporated by reference herein and to be a part of this Registration Statement from the date of the filing of such reports and documents. Any statement contained in a document incorporated or deemed to be incorporated by reference herein shall be deemed to be modified or superseded for purposes of this Registration Statement to the extent that a statement contained herein or in any subsequently filed document that also is deemed to be incorporated by reference herein modifies or supersedes such statement. Any such statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this Registration Statement.

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ITEM 8. EXHIBITS

Exhibit Number	Exhibit Description	Incorporation By Reference			
		Form	SEC File No.	Exhibit	Filing Date
3.1	<a href="#">Amended and Restated Certificate of Incorporation of the Registrant, currently in effect.</a>	8-K	001-35068	3.1	2/28/2011
3.2	<a href="#">Amended and Restated Bylaws of the Registrant, currently in effect.</a>	S-1	333-170594	3.4	1/7/2011
4.1	<a href="#">Reference is made to Exhibits 3.1 through 3.2.</a>				
4.2	<a href="#">Specimen Common Stock Certificate of the Registrant.</a>	S-1	333-170594	4.2	1/31/2011
4.3	<a href="#">Second Amended and Restated Investors' Rights Agreement, among the Registrant and certain of its security holders, dated as of November 23, 2009.</a>	S-1	333-170594	4.3	11/12/2010
4.4	<a href="#">Warrant to Purchase Common Stock of the Registrant, issued to Hercules Technology II, L.P., dated as of December 16, 2013.</a>	10-K	001-35068	4.4	3/17/2014
4.5	<a href="#">Warrant to Purchase Common Stock of the Registrant, issued to Hercules Technology Growth Capital, Inc., dated as of December 16, 2013.</a>	10-K	001-35068	4.5	3/17/2014
4.6	<a href="#">Form of Warrant issued to certain purchasers pursuant to the Securities Purchase Agreement dated May 29, 2012, between the Registrant and the purchasers identified therein.</a>	8-K	001-35068	4.8	5/30/2012
4.7	<a href="#">Warrant Modification Agreement to Purchase Common Stock of the Registrant, issued to Hercules Technology II, L.P. dated as of September 17, 2015.</a>	10-Q	001-35068	4.7	11/3/2015
4.8	<a href="#">Warrant Modification Agreement to Purchase Common Stock of the Registrant, issued to Hercules Technology Growth Capital, Inc. dated as of September 17, 2015.</a>	10-Q	001-35068	4.8	11/3/2015
4.9	<a href="#">Warrant Modification Agreement to Purchase Common Stock of the Registrant, issued to Hercules Technology II, L.P. dated as of September 30, 2016.</a>	10-Q	001-35068	4.9	11/2/2016
4.10	<a href="#">Warrant Modification Agreement to Purchase Common Stock of the Registrant, issued to Hercules Capital, Inc., formerly known as Hercules Technology Growth Capital, Inc., dated as of September 30, 2016.</a>	10-Q	001-35068	4.10	11/2/2016
5.1	<a href="#">Opinion of Cooley LLP</a>				
10.4	<a href="#">2011 Equity Incentive Plan.</a>	S-8	333-172409	99.3	2/24/2011
23.1	<a href="#">Consent of OUM &amp; Co., LLP, Independent Registered Public Accounting Firm.</a>				
23.2	<a href="#">Consent of Cooley LLP (included in Exhibit 5.1).</a>				
24.1	<a href="#">Power of Attorney. Reference is made to the signature page of this Form S-8.</a>				

## SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, the Registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-8 and has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Redwood City, State of California, on March 8, 2018.

### ACELRX PHARMACEUTICALS, INC.

By: /s/ Vincent J. Angotti  
Vincent J. Angotti  
*Chief Executive Officer*

## POWER OF ATTORNEY

**Know All Persons By These Presents**, that each person whose signature appears below constitutes and appoints **VINCENT J. ANGOTTI** and **RAFFI M. ASADORIAN**, and each or any one of them, his true and lawful attorney-in-fact and agent, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to sign any and all amendments (including post-effective amendments) to this Registration Statement, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any of them, or their or his substitutes or substitute, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this Registration Statement has been signed by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
<u>/s/ Vincent J. Angotti</u> VINCENT J. ANGOTTI	Chief Executive Officer and Director <i>(Principal Executive Officer)</i>	March 8, 2018
<u>/s/ Raffi M. Asadorian</u> RAFFI M. ASADORIAN	Chief Financial Officer <i>(Principal Financial and Accounting Officer)</i>	March 8, 2018
<u>/s/ Adrian Adams</u> ADRIAN ADAMS	Chairman	March 8, 2018
<u>/s/ Pamela P. Palmer</u> PAMELA P. PALMER, M.D., PH.D.	Director	March 8, 2018
<u>/s/ Mark G. Edwards</u> MARK G. EDWARDS	Director	March 8, 2018
<u>/s/ Stephen J. Hoffman</u> STEPHEN J. HOFFMAN, PH.D., M.D.	Director	March 8, 2018
<u>/s/ Richard Afable</u> RICHARD AFABLE, M.D.	Director	March 8, 2018
<u>/s/ Howard B. Rosen</u> HOWARD B. ROSEN	Director	March 8, 2018
<u>/s/ Mark Wan</u> MARK WAN	Director	March 8, 2018



March 8, 2018

AcelRx Pharmaceuticals, Inc.  
351 Galveston Drive  
Redwood City, CA 94063

Ladies and Gentlemen:

We have acted as counsel to AcelRx Pharmaceuticals, Inc., a Delaware corporation (the "*Company*"), in connection with the filing of a Registration Statement on Form S-8 (the "*Registration Statement*") with the Securities and Exchange Commission covering the offering of up to 2,035,966 shares of the Company's Common Stock, par value \$0.001 per share (the "*2011 EIP Shares*") issuable pursuant to the Company's 2011 Equity Incentive Plan (the "*2011 EIP*").

In connection with this opinion, we have examined and relied upon (a) the Registration Statement and related prospectuses, (b) the 2011 EIP, (c) the Company's Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws, each as currently in effect, and (d) such other documents, records, certificates, 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 and authenticity of all documents submitted to us as originals, and the conformity to originals of all documents submitted to us as copies thereof. As to certain factual matters, we have relied upon a certificate of officers of the Company and have not sought independently to verify such matters.

Our opinion is expressed only with respect to the General Corporation Law of the State of Delaware. 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, we are of the opinion that the 2011 EIP Shares, when sold and issued in accordance with the 2011 EIP and the Registration Statement and applicable related prospectuses, will be validly issued, fully paid, and nonassessable (except as to shares issued pursuant to certain deferred payment arrangements, which will be fully paid and nonassessable when such deferred payments are made in full).

We consent to the filing of this opinion as an exhibit to the Registration Statement.

Sincerely,

Cooley LLP

By:     /s/ Mark B. Weeks      
Mark B. Weeks

**CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM**

We hereby consent to the incorporation by reference, in the Registration Statement on Form S-8 pertaining to the 2011 Equity Incentive Plan of AcetRx Pharmaceuticals, Inc., of our reports dated March 8, 2018, relating to the consolidated financial statements and the effectiveness of internal control over financial reporting of AcetRx Pharmaceuticals, Inc. appearing in the Company's Annual Report on Form 10-K for the year ended December 31, 2017.

We also consent to the reference to us under the caption "Experts" in the Prospectus.

/s/ OUM & CO. LLP

San Francisco, California  
March 8, 2018