ADVANCED PHOTONIX INC
Form 10-K
June 30, 2014

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

FORM 10-K

(Mark One)

þ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended March 31, 2014

OR

o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from to .

1-11056
(Commission file number)

ADVANCED PHOTONIX, INC. ®
(Exact name of registrant as specified in its charter)

Delaware	33-0325826
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

2925 Boardwalk, Ann Arbor, Michigan 48104
(Address of principal executive offices)

(734) 864-5600
(Registrant's telephone number, including area code)

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

Title of each class	Name of each exchange on which registered
Common Stock, $0.001 par value	NYSE MKT: API

Securities registered pursuant to Section 12(g) of the Exchange Act:
None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. YES o NO þ

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. YES o NO þ

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days. YES þ NO o

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 229.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). YES þ NO o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. o

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

Large accelerated filer o	Accelerated filer o
Non-accelerated filer o (Do not check if a smaller reporting company)	Smaller reporting company þ

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). YES o NO þ

The aggregate market value of the voting stock held by non-affiliates of the registrant as of September 30, 2013 was approximately $14,991,000.

Number of shares outstanding of the registrant's Common Stock as of June 23, 2014: 37,381,413 shares of Class A Common Stock.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant’s definitive Proxy Statement to be filed pursuant to Regulation 14A promulgated under the Securities Exchange Act of 1934 in connection with the 2014 Annual Meeting of Stockholders of registrant have been incorporated by reference into Part III of this Form 10-K.

ADVANCED PHOTONIX, INC.
FORM 10-K
FISCAL YEAR ENDED MARCH 31, 2014
TABLE OF CONTENTS

		Page
	Part I	
Item 1.	Business	4
Item 1A.	Risk Factors	12
Item 2.	Properties	31
Item 3.	Legal Proceedings	31
Item 4.	Mine Safety Disclosures	31
	Part II	
Item 5.	Market for Registrant's Common Equity, Related Shareholder Matters and Issuer Purchases of Equity Securities	32
Item 6.	Selected Financial Data	32
Item 7.	Management's Discussion and Analysis of Financial Condition and Results of Operations	32
Item 7A.	Quantitative and Qualitative Disclosures about Market Risk	44
Item 8.	Financial Statements and Supplementary Data	44
Item 9.	Changes In and Disagreements with Accountants on Accounting and Financial Disclosure	71
Item 9A	Controls and Procedures	71
Item 9B.	Other Information	71
	Part III	
Item 10.	Directors, Executive Officers and Corporate Governance	72
Item 11.	Executive Compensation	72
Item 12.	Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	72
Item 13.	Certain Relationships and Related Transactions, and Director Independence	72
Item 14.	Principal Accountant Fees and Services	72
	Part IV	
Item 15.	Exhibits and Financial Statement Schedules	73
Signatures		80

PART I

Except for the historical information contained herein, this report contains forward looking statements that involve a number of risks and uncertainties, including the difficulty of predicting demand for new optoelectronic products, the impact of competitive products and pricing, challenges to our intellectual property, our expectations about the impact of our acquisition of the non-automotive assets of Silonex, Inc. (Silonex) on our results and business and our ability to realize the expected benefits from the acquisition and successfully implement our plans and expectations for the Silonex business, the sufficiency of our sources of funding, the uncertainty and timing of the development and launch of new optoelectronic products, as well as other statements regarding our future operations, financial condition and prospects, and business strategies. Forward-looking statements may appear throughout this report, including without limitation, the following sections: Item 1 "Business," Item 1A "Risk Factors," and Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations." Forward-looking statements generally can be identified by words such as "anticipates," "believes," "estimates," "expects," "intends," "plans," "predicts," "projects," "will be," "will c likely result," and similar expressions. These forward-looking statements are based on current expectations and assumptions that are subject to risks and uncertainties, which could cause our actual results to differ materially from those reflected in the forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to, those discussed in this Annual Report on Form 10-K, and in particular, the risks discussed under the caption "Risk Factors" in Item 1A and those discussed in other documents we file with the Securities and Exchange Commission (SEC). We undertake no obligation to revise or publicly release the results of any revision to these forward-looking statements, except as required by law. Given these risks and uncertainties, readers are cautioned not to place undue reliance on such forward-looking statements

Item 1. Business

General

Advanced Photonix, Inc. ® (the Company, we, us, our or API) was incorporated under the laws of the State of Delaware in June 1988. We are engaged in the development and manufacture of optoelectronic devices and value-added sub-systems and systems. We serve a variety of global Original Equipment Manufacturers (OEMs) in four primary markets. We support our customers from the initial concept and design phase of the product, through testing to full-scale production. We have two manufacturing facilities located in Camarillo, California and Ann Arbor, Michigan.

Products and Technology

Our Business

We are a leading test and measurement company that packages optoelectronic semiconductors into high-speed optical receivers ("HSOR" products), custom optoelectronic subsystems ("Optosolutions" products) and Terahertz instrumentation ("THz" products), serving a variety of global markets. Our HSOR transmission products are deployed in the internet infrastructure to enable the high-speed bandwidth necessary to support video and data for your TV, computer, tablet or smart phone anytime and anywhere. Our communication test and measurement products ("Comtest") are used to develop, manufacture and test optical communication equipment used in the telecom infrastructure. Our Optosolutions products are sold to a number of scientific instrumentation manufacturers for various applications such as metrology, currency validation, flame monitoring, solar panel quality, temperature sensing, particle detection, color sensing, infrared detection and many other applications that can only be done through optical sensing. Our T-Gauge® systems are used to measure and verify physical properties on-line and in real-time to reduce raw materials and rework costs in manufacturing processes as well as conduct quality control monitoring. Our established and growing

patented Terahertz technology has allowed us to expand from the laboratory market into the 24/7 industrial process and quality control manufacturing, military/aerospace, and security markets.

We support the customer from the initial concept and design of the semiconductor, hybridization of support electronics, packaging and signal conditioning or processing from prototype through full-scale production and validation testing. The target markets served by us are Test and Measurement, Military/Aerospace, Telecom Transmission, and Medical.

Technology & Manufacturing Capabilities

Our basic technologies and manufacturing capabilities include the following:

- Optoelectronic semiconductor design and micro fabrication of III-V compound semiconductor (Indium Phosphide or InP and Gallium Arsenide or GaAs) and Silicon (Si) devices including photodetectors and terahertz transmitters/receiver antenna,
- Molecular Beam Epitaxy (MBE) growth of high-speed III-V compound semiconductor material including GaAs, InAlAs(Indium Aluminum Arsenide)and InP,
- High speed semiconductor analog amplifier specification, evaluation and design for outside fabrication,
- Photonic integrated circuit (PIC) coherent mixers and delay line interferometer (DLI) specification, evaluation, post processing, and design for outside fabrication for use in 40Gb/s and 100 Gb/s line side optical receivers,
- Opto-electronic hybrid packaging of semiconductor devices combining opto-electronic devices with high-speed electronicsand fiber optics,
- Vapor deposition and/or ion implantation for Silicon based Positive Intrinsic Negative (PIN) photo-detectors, Avalanche Photonic Detectors (APD's) and Large Area Avalanche Photo Detectors (LAAPD),
- Terahertz systems, subsystems, transmitters and receivers, transceivers and motion control hardware and software,
- Femtosecond laser specification, valuation, design and manufacture and
- Chromatic dispersion, polarization dispersion and optical delay management in complex optical systems.

Core Products

The core product technologies used in the majority of our products are opto-electronic semiconductor devices, including photodiodes and antennae made of Si or III-V compound semiconductor material and high speed semiconductor analog amplifiers. Photodiodes and antennae sense light of varying wavelengths and intensity and convert that light and/or Terahertz wave into electrical signals. Analog amplifiers increase the converted electrical signals output power to a level required to communicate with follow on electrical components. We manufacture photodiodes of varying complexity, from basic PIN photodiode to the more sophisticated APD and antennae that transmit and receive Terahertz signals. The APD is a specialized photodiode capable of detecting very low light levels due to an internal gain phenomenon known as avalanching. All photodiode and THz devices are designed by our experienced engineering staff, and most are fabricated in our state-of-the-art clean rooms. Some of our analog amplifiers are specified and tested by our engineering staff, designed by subcontractors and fabricated by outside suppliers. Our products include the following:

- High Speed Optical Receivers (2.5 Gigabytes per second or Gb/s, 10Gb/s, 40Gb/s & 100Gb/s)packaged with InP, InAlAs, or GaAs PIN and/or APD photodiodes, electrical amplifiers and PIC's.
- PIN and APD photodiodes and arrays in Si and III-V materials (InP, InAlAs, GaAs).
- Packaged PIN and APD photodiodes in Si and III-V materials (InP, InAlAs, GaAs).
- Packaged Si APD components, with and without thermo-electric coolers.
- Packaged Si LAAPD components.
- Packaged Si photodiodes with patented FILTRODE® technology integrating optical filters directly on photodiode chips.
- Terahertz Systems & subsystems utilizing III-V materials for Terahertz transmitters &/or receivers.

Terahertz Technology

One of the high growth technologies we are pursuing is Terahertz based on our T-Ray® product platforms. THz is a region of the electromagnetic spectrum that lies between microwave and infrared waves and is in the early stages of adoption. While microwaves and infrared waves have been explored and commercialized for decades, THz waves are in the early stages of being explored and commercialized due to the fact that they have historically been very difficult to generate and detect. Recent advances in femtosecond lasers and ultra-fast semiconductor and electro-optic devices combined with fiber-optic packaging technologies have enabled the development of practical T-Ray® instrumentation for the research market with increasing adoption in the industrial, military and aerospace markets as a result of our growing group of value added resellers' application and market development efforts. THz can be used to "look" through and beneath materials with high 2-dimensional (2-D) and 3-dimensional (3-D) spatial resolution roughly equivalent to the resolution of the human eye or better. It can also uniquely identify the chemical composition of many hidden or subsurface objects using non-ionizing radiation, which is not harmful to humans at the power levels commonly used today. THz imaging and spectroscopy market applications include industrial quality control through non-destructive testing (including aerospace and pharmaceutical markets); homeland security and defense screening of people, packages and bags for weapons and weapons of mass destruction; medical imaging and other scientific applications.

We have had significant Terahertz technology and product development since 1997, resulting in 122 patents or patents pending to date. In 2001, we sold the first commercial THz product, the T-Ray2000®, as a laboratory bench top instrument for application development with spectroscopy and imaging capabilities targeted at the research and development and off-line diagnostic markets. In 2004, we sold the first T-Ray® Manufacturing Inspection System (QA1000) for on-line, real-time inspection to NASA for the space shuttle fuel tank inspection in the Return to Flight Program. In March 2008, we shipped our next generation THz imaging and spectroscopy system (T-Ray 4000®). The T-Ray 4000® is significantly smaller, lighter, and more powerful than previous THz generations and incorporates significant technological advancements. The system weighs 55 pounds and is the size of a briefcase, which is a significant reduction from the 800 pound refrigerator size QA1000. In 2012, we introduced our fifth generation product called T-Gauge®, which weighs 35 pounds. This product is targeted at the industrial, NDT and process quality control market. We have established and continue to develop a value added reseller (VAR) network to accelerate adoption in vertical industrial markets, initially targeting the nuclear gauge replacement market. To date, we have entered into VAR agreements with three established industrial process and quality control companies and a purchase agreement with an OEM in a vertical market.

Markets

Our products serve customers in a variety of global markets, typically North America, Asia, Europe and Australia. The target markets and applications served by us are as follows:

Test and Measurement:

Manufacturing, process and quality control

Instrumentation

Currency Validation

Comtest

Industrial

Telecommunications:

- Long Haul/Metro Transmission
- Enterprise/Access and Fiber to the premises Transmission
- Government

Military:

- Space
- Defense

Medical:

- Diagnostic & Monitoring
- Ophthalmic Equipment
- Medical Imaging

Raw Materials

Our principal raw materials used in the manufacture of our products are silicon and III-V material (InP, GaAs) wafers, chemicals, gases and metals used in processing wafers, gold wire, solders, electronic components, high speed specialized semiconductor amplifiers, PIC's, and a variety of packages and substrates, including metal, printed circuit board, flex circuits, ceramic and plastic packages. All of these raw materials can be obtained from several suppliers. However, we depend on suppliers whose components have been qualified into our products and who could disrupt our business if they stop, decrease or delay shipments or if the components they ship have quality or consistency issues. From time to time, particularly during periods of increased industry-wide demand, silicon wafers, III-V wafers (InP, GaAs), certain metal packages and other materials have been in short supply. During the early part of our fiscal 2013, we or our customers were adversely affected by the lingering effect of supply chain disruptions caused by the tsunami in Japan and flooding in Thailand. In the second half of fiscal 2013, we were affected by limitations in supply of a critical component used in our 100G HSOR product which limited our revenues. In the press release dated June 7, 2013, we announced that these supplier bottlenecks had been alleviated. In the future, any significant increase in lead times or shortage in supply on critical components could reduce future growth.

Research and Development

Since our inception in June 1988, we have incurred material research and development (R&D) expenses, with the intent of commercializing these investments into profitable new standard and custom product offerings. During the fiscal years ended in 2014 and 2013, research and development expenses were $5.0 million and $5.7 million, respectively, which we believe was adequate to maintain the necessary investment in our future growth platforms. We will continue to pursue government funded, as well as internally funded, research and development projects when they are in support of the our development objectives. During fiscal years 2014 and 2013, approximately $0.8 million and $2.2 million, respectively, of our R&D spending was government funded, respectively.

As we begin the new 2015 fiscal year, the following research and development projects are currently underway:

HSOR – next generation photodiodes and high-speed optical receivers for the 10G, 40G and 100G telecommunications market:

- Next generation 100G DP-QPSK coherent receivers for long haul and metro markets.
- 1st generation 28Gb/s APD's for the 100G enterprise/access market.
- 4th generation integrated 40G NRZ for the enterprise/access market.
- 2nd generation 2.5G APD for the fiber to the premises (FTTx)
- 2nd generation 10G APD chip and ROSA package for the fiber to the premises (FTTx)
- 2nd generation high speed multi mode receivers for testing 32Gb/s fiber channel and 100Gb/s Ethernet products.

Terahertz – applications and enhancements to support market penetration.

- Application and software development utilizing the T-Gauge®, product platform for industrial quality and process control markets.
- T-Gauge®, platform cost reduction initiatives.
- Next generation multi-channel systems to support various vertical market requirements.

Custom Optoelectronics – PIN and subassembly developments.

- Medical monitoring subsystem product.
- Productization of a tunable light source for medical and test and measurement applications.

7

Environmental Regulations

The photonics industry, as well as the semiconductor industry in general, is subject to governmental regulations for the protection of the environment, including those relating to air and water quality, solid and hazardous waste handling, and the promotion of occupational safety. Various federal, state and local laws and regulations require that we maintain certain environmental permits. We believe we have obtained all necessary environmental permits required to conduct our manufacturing processes. Changes in the aforementioned laws and regulations or the enactment of new laws, regulations or policies could require increases in operating costs and additional capital expenditures and could possibly entail delays or interruptions of operations.

Backlog and Customers

Our sales are made primarily pursuant to standard purchase orders for delivery of products. A substantial portion of our revenues are derived from sales to OEMs pursuant to individual purchase orders with short lead times. However, by industry practice, orders may be canceled or modified at any time. Accordingly, we do not believe that the backlog of undelivered product under these purchase orders is a meaningful indicator of our future financial performance. When customers cancel an order, they are responsible for all finished goods; all incurred costs, direct and indirect, as well as a reasonable allowance for anticipated profits. No assurance can be given that we will receive these amounts after cancellation.

Customers normally purchase our products and incorporate them into products that they in turn sell in their own markets on an ongoing basis. As a result, our sales are dependent upon the success of our customers' products and our future performance is dependent upon our success in finding new customers and receiving new orders from existing customers.

Marketing

In the United States and Canada, we market our products through a mix of technical sales engineers, salesmen, value added resellers, and independent sales representatives. International sales, including Europe, the Middle East, Far East and Asia, are conducted directly by the technical sales engineers and at times in conjunction with foreign distributors, value added resellers and representatives. Our products are primarily sold as components or sub-assemblies to OEMs and we market our products and capabilities through industry specific channels, including the Internet, industry trade shows, and in print through trade journals.

Competition

In our target markets, we compete with different companies in each of our three major product platforms: custom optoelectronic, high-speed optical receiver and THz systems. We believe that our principal competitors for sales of custom optoelectronic products are small and medium size private companies and medium size public companies such as First Sensor, Excelitas, a division of Illinois Tool Works (ITW), and a division of OSI Systems (OSIS). In the high-speed optical receiver market, certain product lines compete against some mix of the following competitors; JDS Uniphase (JDSU), Neophotonix (NPTN), Finisar, Avago, a division of Fujitsu (FOC), a division of Nippon Electric (NEL) and several other smaller companies. Because the THz product offering includes developing technology applications and markets, we believe the competition is mainly from several early stage small private companies like Menlo Systems supported by research institutions like the Fraunhofer Institute in Germany, Teraview, Advantest and the use of alternative technologies, mainly nuclear gauges that are bundled with other process control equipment within divisions of several larger public companies.

Because we specialize in devices requiring a high degree of engineering expertise to meet the requirements of specific applications, we generally do not compete with other large United States, European or Asian manufacturers of standard “off the shelf” optoelectronic components or silicon photodetectors.

Proprietary Technology

We utilize proprietary design rules and processing steps in the development and fabrication of our PIN and APD photodiodes, THz transmitters and receivers, fiber-coupled THz subsystems/systems, and THz applications. We have a significant number of patents pending and own the following patents and registered trademarks:

Patents and Trademarks Issued in Fiscal 2014

Patent/Trademark #	Title	Issue Date
8,436,310	System and method reducing fiber stretch induced timing errors in fiber optic coupled time domain terahertz systems	May-13
8,457,915	System and method to measure the transit time position(s) of pulses in a time domain data	Jun-13
2509530	Precision Fiber Attachment	Jul-13
1332068	Terahertz imaging system for examining particles	Nov-13

Patents and Trademarks Issued in Prior Years

Patent/Trademark #	Title	Issue Date
8,390,910	Picosecond Optical Delay	Mar-13
5166024	Terahertz Imaging System for Examining Articles	Dec-12
4,218,098	Trademark for T-Gauge	Oct-12
5022032	Pin Photodetector	Jun-12
5021888	Enhanced Photodetector	Jun-12
4980238	High Speed Ingaas Photoconductive Device	Apr-12
2474560	Planar Avalance Photodiode	Mar-12
1131650	Pin Photodetector	Mar-12
200580041877.4	HIGH SPEED INGASS PHOTOCONDUCTIVE DEVICE (CHINA)	Apr-11
1,034,433		