Rubicon Technology, Inc.
Form 10-K
March 13, 2014
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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 December 31, 2013**

or

¨ **Transition report pursuant to section 13 or 15(d) of the Securities Exchange Act of 1934 for the transition period from to**

Commission file number 001-33834

RUBICON TECHNOLOGY, INC.

(Exact Name of Registrant as Specified in Its Charter)

Delaware	**36-4419301**
(State or Other Jurisdiction of Incorporation or Organization)	**(I.R.S. Employer Identification No.)**

900 East Green Street

Bensenville, Illinois	**60106**
(Address of Principal Executive Offices)	**(Zip Code)**

Registrant s Telephone Number, Including Area Code: (847) 295-7000

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

Title of each class	**Name of each exchange on which registered**
Common Stock, Par Value $0.001 per share	**The NASDAQ Global Market**

Securities registered pursuant to Section 12(g) of the 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 ¨ No þ

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. Yes ¨ 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 ¨

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Website, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 232.405 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 ¨

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. ¨

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 ¨ Accelerated filer þ Non-accelerated filer ¨ Smaller reporting company ¨

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ¨ No þ

As of June 30, 2013, there were 17,701,022 shares of common stock outstanding held by nonaffiliates of the registrant, with an aggregate market value of the common stock (based upon the closing price of these shares on the NASDAQ Global Market) of approximately $141,077,145.

The number of shares of the registrant s common stock outstanding as of the close of business on March 7, 2014 was 25,765,795.

Documents incorporated by reference:

Portions of the Registrant s Proxy Statement for its Annual Meeting of Stockholders are incorporated by reference into Part III of this Annual Report on Form 10-K provided, that if such Proxy Statement is not filed with the Commission within 120 days after the end of the fiscal year covered by this Form 10-K, an amendment to this Form 10-K shall be filed no later than the end of such 120-day period.

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PART I

All statements, other than statements of historical facts, included in this Annual Report on Form 10-K regarding our estimates, expectations, beliefs, intentions, projections or strategies for the future, results of operations, financial position, net sales, projected costs, prospects and plans and objectives of management for future operations may be forward-looking statements as defined in the Private Securities Litigation Reform Act of 1995. We have based these forward-looking statements on our current expectations and projections about future events and financial trends that we believe may affect our financial condition, results of operations, business strategy, short-term and long-term business operations and objectives and financial needs. These forward-looking statements can be identified by the use of terms and phrases such as believe, plan, intend, anticipate, target, estimate, expect, and the like, and/or future-tense or conditional constructions such as will, may, could, s the negative thereof). Items contemplating or making assumptions about actual or potential future sales, market size and trends or operating results also constitute forward-looking statements.

Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. Before investing in our common stock, investors should be aware that the occurrence of the risks, uncertainties and events described in the section entitled Risk Factors and elsewhere in this Annual Report could have a material adverse effect on our business, results of operations and financial condition.

Although we believe that the expectations reflected in the forward-looking statements are reasonable, forward-looking statements are inherently subject to known and unknown risks and business, economic and other risks and uncertainties that may cause actual results to be materially different from those discussed in these forward-looking statements. Readers are urged not to place undue reliance on these forward-looking statements, which speak only as of the date of this Annual Report. We assume no obligation to update any forward-looking statements in order to reflect any event or circumstance that may arise after the date of this Annual Report, other than as may be required by applicable law or regulation. If one or more of these risks or uncertainties materialize, or if the underlying assumptions prove incorrect, our actual results may vary materially from those expected or projected.

This Annual Report also contains statistical data and estimates, including those relating to market size and growth rates of the markets in which we participate, that we obtained from industry publications and reports generated by market research firms. These publications typically indicate that they have obtained their information from sources they believe to be reliable, but do not guarantee the accuracy and completeness of their information. Although we have assessed the information in such publications and found it to be reasonable and believe the publications and reports are reliable, we have not independently verified their data.

You should read this Annual Report and the documents that we reference in this Annual Report and have filed with the Securities and Exchange Commission (the SEC) as exhibits with the understanding that our actual future results, levels of activity, performance and events and circumstances may be materially different from what we expect.

Unless otherwise indicated, the terms Rubicon, the Company, we, us, and our refer to Rubicon Technology, Inc.

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ITEM 1. BUSINESS

OVERVIEW

We are a vertically integrated, advanced electronic materials provider specializing in monocrystalline sapphire for applications in light-emitting diodes (LEDs), optical systems and specialty electronic devices. The emergence of sapphire in commercial volumes at competitive prices has enabled the development of new technologies such as high brightness (HB) white, blue and green LEDs and highly-integrated radio frequency integrated circuits (RFICs). Recently, sapphire has been adopted for use in several new applications in mobile devices, specifically camera lens covers, dual flashes and home buttons on certain newer model smartphones. The reason sapphire was adopted for use on the home button on certain smartphones is because of the scratch resistance and increased touch capacitance it offers, which are important characteristics to ensure the effectiveness of the fingerprint recognition security built into the device. We believe that the use of fingerprint recognition security and other biometrics could become more prevalent in the future, which could become a strong growth driver for sapphire. We apply our proprietary crystal growth technology to produce high-quality sapphire products efficiently to supply our end-markets, and we work closely with our customers to meet their quality and delivery needs.

We are a vertically-integrated manufacturer of high-quality sapphire substrates and optical windows that are used in a variety of high-growth, high-volume end-market applications. Our largest product lines are:

- sapphire cores, two to six inches in diameter, which our customers further process into wafers for use in LED applications and into components such as lens covers for mobile devices;
- six-inch sapphire wafers that are used as substrates for the manufacture of LED chips and to a lesser extent for other semiconductor applications such as Silicon-on-Sapphire (SoS) RFICs; and
- Optical sapphire components in various shapes and sizes, including round and rectangular windows and blanks, domes, tubes and rods. These optical sapphire products are used in equipment for a wide variety of end markets, including defense and aerospace, medical devices, oil and gas drilling, semiconductor manufacturing and other markets.

For the LED market, we sell two to four-inch material primarily in core form and six and eight-inch material primarily in polished wafer form. Eight-inch wafers are sold primarily for customers research and development efforts at this time. We have the ability to produce cores and wafers of up to twelve inches in diameter to support production of chips for next-generation LED and other electronic applications. Larger sapphire also has current applications in the optical markets. In other semiconductor markets, we sell primarily six-inch wafers; our major customer in that market, however, is modifying its technology to produce its higher volume RFIC products on a substrate other than sapphire, a development which will likely significantly reduce the amount of sapphire demand from that market beginning in early 2014. Other non-LED semiconductor customers are using sapphire in research and development at this time.

We recently introduced a new product offering, patterned sapphire substrates or PSS . HB LED chip manufacturers etch a pattern onto the surface of the sapphire wafer in the early stages of their production process in order to improve light output. We have leveraged our capability in producing larger diameter sapphire wafers to offer pre-patterned, larger diameter (four-inch and six-inch) wafers to the LED market.

We believe that LED production is following a similar path to that of production of integrated circuits on silicon substrates, which gradually migrated to production on increasingly larger substrates in order to reduce manufacturing costs. We feel that this migration to larger substrates and the related efficiency gains will help reduce the prices of LED devices and thereby facilitate greater adoption of LED technology in the backlighting and general lighting markets.

Our vertically-integrated manufacturing capabilities enable us to maintain our high quality standards while controlling costs. We design, assemble and maintain our own proprietary crystal growth furnaces to grow high-

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purity, low-stress, ultra-low-defect-density sapphire crystals. In addition, we possess state-of-the-art capabilities in high-precision core drilling, wafer slicing, surface lapping, edge bevel grinding, polishing, patterning and wafer cleaning processes. We foster a strong sense of innovation and agility in our product development teams in an attempt to develop new products more effectively and to rapidly capture market growth.

We plan to leverage our technological advantage in efficiently producing high-quality, large-diameter sapphire products to maintain our leadership position and capitalize on future growth opportunities. To attain this goal, we are investing in research and development activities, continuing to enhance our operational capabilities, increasing our brand recognition and diversifying into new market segments.

We are a Delaware corporation incorporated on February 7, 2001. Our common stock is listed on the NASDAQ Global Market under the symbol RBCN.

INDUSTRY OVERVIEW

Integrated circuits and other semiconductor devices have traditionally been fabricated on silicon substrates. However, for certain advanced applications, new electronic materials have emerged as the substrates of choice due to evolving integration and performance considerations. For example, sapphire is the preferred substrate material for HB white, blue and green LED applications due to its crystal lattice compatibility with the aluminum gallium nitride (AlGaN) epitaxial layers, thermal expansion properties, commercial availability and cost efficiency.

LED applications

Advancements in solid state lighting utilizing HB white, blue and green LEDs over the past decade represent a disruptive technology in the lighting industry, providing significant performance, environmental and economic improvements compared to traditional incandescent or fluorescent lighting. For example, traditional incandescent lamps are inefficient and costly, emitting over 90% of consumed power as heat and lasting only 1,500 to 2,000 hours. Fluorescent lamps produce light by passing electricity through toxic mercury vapor, which creates an environmental disposal problem. LEDs do not contain mercury or lead and are 4.0 to 6.6 times as efficient as traditional incandescent lamps, while providing 35,000 to 50,000 hours of light. These factors, along with their durability, small form factor, excellent color performance and decreasing costs, have led to growing demand for LEDs in applications such as small displays for mobile devices, flashes for digital cameras, backlighting units (BLUs) for displays used in notebook computers, desktop monitors, LCD televisions, public display signs, automotive lights, street lights, traffic signals and general and specialty lighting. Applications using LEDs have unit volumes in the billions and are expected to grow significantly over the next several years. The majority of HB LEDs are produced on sapphire substrates. Therefore, as the HB LED market grows, we believe the sapphire substrate market will grow as well.

Mobile devices. LEDs are used in color displays for mobile phones and other portable electronics such as GPS systems, MP3 players and digital camera flashes. LEDs are well suited for mobile devices due to their low current drain which extends battery life and durability while generating less heat. For these reasons, the vast majority of mobile devices utilize LED lighting.

LED backlighting units for large displays. LED BLUs now frequently replace conventional fluorescent BLUs in LCD flat panel televisions, notebook computers and desktop monitors. Benefits of LED BLUs in these applications are reduced power consumption/extended battery life, thinner displays, quicker response time and better color rendition. Displays made with LED BLUs also have no toxic materials, which helps electronics manufacturers to comply with environmental regulations.

Automotive lighting. Automobile manufacturers are increasingly using LEDs in car and truck headlights, turning and tail light functions as well as interior lighting. Benefits include near-instant response time, reduced

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power usage and more stylish and effective designs. Increased LED usage in other transportation vehicles such as motorcycles and commercial jets offers additional growth potential.

Commercial signage/displays. LEDs are widely used as light sources on large signs, LED displays and outdoor displays, such as jumbo screens used in sporting arenas and electronic billboard displays.

General illumination. LEDs are increasingly being used for outdoor and indoor commercial and public lighting, architectural lighting, street lights, traffic signals, retail displays, residential lighting, replacement lamps and off-grid lighting for developing countries. General illumination is expected to be one of the fastest growing applications for HB LEDs.

Optical applications

Sapphire is utilized for windows and optics for aerospace, sensor, medical and laser applications due to its wide-band transmission, superior strength, scratch resistance and high strength-to-weight ratio. Sapphire s physical properties make it very well suited for jet fighter targeting pod windows, forward-looking infrared windows for commercial and business jets as well as unmanned air vehicles or drones, rocket domes and transparent armor for military vehicles.

Recently, sapphire has been adopted for use in several new applications in mobile devices, specifically camera lens covers, dual flashes and home buttons on certain newer model smartphones. The switch to sapphire for these mobile device applications is because sapphire is highly scratch resistant and offers improved touch capacitance which are important characteristics to ensure the effectiveness of the fingerprint recognition security recently built into the home button functionality of one of the major brands of smartphones. Biometrics, such as fingerprint recognition, provides greater security than a password. Data security is becoming an increasing concern in society and we believe that the use of biometrics could increase in coming years, which could increase demand for sapphire.

Other semiconductor applications

SoS integrated circuits consist of a thin layer of silicon grown on a sapphire substrate and are primarily used in advanced wireless and military applications, such as RFICs. In particular, SoS RFICs are currently used in mobile phones, broadband television set-top boxes, satellites and radiation-hardened applications for the defense industry.

Sapphire is also currently being experimented with as a substrate to produce certain power devices. If our customers are successful with their development efforts, this market could evolve into a growth opportunity for sapphire suppliers.

Sapphire substrate industry supply chain

The production process for sapphire substrates is substantially similar to that of silicon wafers. A typical process flow consists of crystal growth, fabrication, slicing, lapping and polishing steps. Output quality is measured in flatness, desired crystal planar orientation, etch pitch density and crystalline structure uniformity. A great emphasis is placed on continuously improving yields and increasing production efficiency to drive costs lower to take advantage of emerging high-volume opportunities. Device manufacturers are seeking larger diameter sapphire wafers to allow them to gain efficiency in their production processes through higher throughput and reduced edge loss. Historical methods of sapphire crystal growth, which rely on lower-volume batch processes, are less able to meet the needs of leading end-market customers for high-quality crystals, demanding dimensional tolerances, high production volumes, cost efficiency and on-time delivery. Sapphire is the material on which the entire value chain is built.

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TECHNOLOGY

Rubicon, as a vertically integrated manufacturer, has developed proprietary advanced technology at every stage of production from raw material processing through crystal growth, fabrication, wafer finishing, patterning and cleaning.

Our proprietary ES2 crystal growth technique produces high-quality sapphire crystals for use in our sapphire products. ES2 is derived from the standard Kyropoulos method of crystal growth. We developed this technique with the goal of establishing greater control over the crystal growth process while maintaining minimal temperature variations. Unlike other techniques, during the ES2 technique, the growing sapphire crystal exists in an unconstrained, low stress environment inside a closed growth chamber. The closed system allows for enhanced control of the melt, resulting in higher quality crystals. The temperature gradient between the melt and the crystal in the ES2 technique is significantly lower than in other crystal growth techniques. These aspects of the ES2 technique enable us to grow crystals that have a significantly lower dislocation density, higher crystal purity and greater uniformity than sapphire crystals grown using other techniques. The ES2 technique provides an inherent annealing process once the crystal is fully grown. This thermal annealing is an integral means of relieving stress in the crystal during the ES2 process. We believe we can readily scale our ES2 technology in a production environment while maintaining high crystal quality even as crystal boule size is increased. As a result of our proprietary ES2 technology, we believe that we currently offer the most efficient method for manufacturing large form factor, high-quality sapphire in the market today.

We have automated the crystal growth process of our proprietary ES2 technique. Our furnace environments are controlled by closed-loop control systems and the overall crystal growth process is run with minimal operator intervention, which reduces the potential for human error. In addition, a single operator can supervise the control of multiple ES2 furnaces simultaneously, which reduces costs.

We believe our proprietary ES2 process provides significant advantages over other crystal growth methods such as CZ and EFG. Unlike the ES2 technique, the CZ and EFG methods grow crystals with much higher levels of stress. This stress can decrease the overall quality of the sapphire crystal and requires increased processing time to relieve this stress, which increases production costs and decreases throughput, especially in larger diameter crystals. During the EFG process, the crystal is grown in a sheet form by pulling it through a die directly from the melt; while in the CZ process, the crystal must be rotated and pulled as the aluminum oxide melt is consumed. These constrained growth environments with higher thermal gradients increase stress and decrease crystal quality.

Our research and development (R&D) activity plays a vital role in supporting our technology, product and revenue roadmaps. In 2013, 2012 and 2011, our R&D expenses totaled $2.3 million, $2.3 million and $1.8 million, respectively. Our R&D is focused on three key areas:

- large area sapphire growth and fabrication;
- higher precision sapphire processing; and
- cost-effective optical components for mobile devices.

Our technical staff possesses deep and broad expertise in materials science and engineering. We also develop and utilize sophisticated metrology equipment to perform material and process characterization.

PRODUCTS

We offer a wide variety of sapphire products designed to meet the stringent specifications of our customers. Using our proprietary ES2 technology, we grow high-quality sapphire boules. We fabricate our products from the boules and sell them in four general categories: core, as-cut, as-ground and polished. We currently offer two, three, four, six and eight-inch diameter wafers, in C, R, A, and M planar orientations. A sapphire crystal has multiple orientation planes resulting from its crystalline structure symmetry.

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Each orientation of the crystal structure is represented by a letter and differs in lattice structure. These variations result in different chemical, electrical and physical properties depending on the particular orientation plane. As a result, customers require different orientation planes depending on the intended application. For example, LED manufacturers typically request C plane crystals while SoS manufacturers typically request R plane crystals.

While we continue to offer all of the following products, our sales efforts are now focused on selling two through four-inch cores to our polishing customers and four, six and eight-inch polished wafers to our semiconductor device manufacturing customers.

Product	Size	Orientation	Applications
Core	2, 3, 4	C, R, A, M	LED Optical windows Blue laser diode
As-Cut	2, 3, 4, 6 , 8	C, R, A, M	Wafers for LED Wafers for blue laser diodes Wafers for SOS RFICs
As-Ground	2, 3, 4, 6 , 8	C, R, A, M	Wafers for LED Wafers for SOS RFICs Blanks for optical windows Wafer carriers
Polished	4 , 6 , 8	C, R, A	Epi-polished wafers for SOS RFICs Polished optical windows Double-side polished wafer carriers
Patterned Sapphire Substrate	4 , 6	C	Epi-polished patterned wafers for RFICs

Core

Our core product line consists of our sapphire cores drilled from sapphire boules with high-precision. In 2013, 2012 and 2011, sales of core accounted for 56%, 15% and 46% of our revenue, respectively. Revenue from sapphire cores increased through the first half of 2011, then declined due to excess inventory at polishers and LED manufacturers. Major suppliers of sapphire, including us, added capacity in 2010 and 2011, resulting in excess supply during 2012 which caused lower product prices. We chose to sell fewer sapphire cores in 2012 awaiting price improvement. Compared with historical pricing, core prices continued to be low in 2013, but prices steadily increased through most of 2013. We expect that pricing will continue to recover as LED production volumes increase.

As-cut

Our as-cut product line consists of sapphire cores sliced using a wire saw machine. We believe we are able to offer our customers one of the highest-precision cut sapphire wafers in the market. This is especially important to customers who require precise orientation planes for applications such as LEDs, SoS, RFICs and blue laser diodes. In each year ended December 31, 2013, 2012 and 2011, sales of as-cut wafers accounted for less than 10% of our revenue.

As-ground

Our as-ground product line consists of cut sapphire wafers that undergo a double-sided lapping and edge grinding process. The lapping process ensures that the surface of the wafer is flat and smooth and has a high

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degree of parallelism. The grinding process bevels the edges of the wafers, making them more durable and less susceptible to chipping and cracking. In each year ended December 31, 2013, 2012 and 2011, sales of as-ground wafers accounted for less than 10% of our revenue.

Polished

Our polished product line primarily consists of finely polished, ultra-clean, six and eight-inch sapphire wafers. Our polished wafers undergo two polishing phases including both a mechanical and a chemical mechanical planarization phase. We believe we are currently one of a small number of fully vertically integrated firms offering six and eight-inch, high-quality C-plane and R-plane polished wafers. In 2013, 2012 and 2011 sales of polished wafers accounted for 29%, 75% and 49% of our revenue, respectively. Sales of six-inch polished sapphire wafers increased in 2011 and 2012 with certain LED chip manufacturers migrating to a six-inch production platform and with the growth of the SoS RFIC market, which has subsequently decreased in size. The percentage of revenue coming from six-inch wafer sales in 2012 was particularly high due to reduced sales of sapphire core in that period. The proportion of revenue from polished wafers in the future will depend on a number of factors, including customer adoption of large-diameter sapphire wafers in the LED market, customer decisions to purchase patterned versus polished wafers and pricing for our various products, including cores.

Patterned sapphire substrates

Our patterned sapphire substrates (PSS) product line was introduced in 2013 and consists of finely polished, ultra-clean, four and six-inch patterned sapphire wafers. LED chip manufacturers etch a pattern onto the surface of the sapphire wafer in the early stages of their production process in order to improve light output. We are leveraging our capability in producing larger diameter sapphire wafers to offer pre-patterned, larger diameter (four-inch and six-inch) wafers to the LED market. We offer fully customizable, sub-micron patterning capability with dimensional tolerances within one tenth of a micron. We also offer the industry s smallest edge exclusion zone maximizing the usable wafer surface area yielding more chips per wafer. We believe we are the first vertically integrated sapphire producer to offer high volume four and six-inch patterned substrates. During 2013, we shipped samples of four and six-inch wafers with a wide variety of pattern types, densities and heights. We believe this product line will generate increasing revenue in 2014. In 2013, sales of PSS wafers accounted for less than 10% of our revenue.

Other

We also offer optically-polished windows and ground window blanks of sapphire. We provide sapphire and other crystal products in many sizes, shapes and product formats for specialty applications.

MANUFACTURING

The process of growing the crystal begins by heating the raw material, aluminum oxide, until it reaches an ideal temperature above its melting point. This ideal temperature is essential for our process because it allows us to produce high-purity crystals with very low defect rates. Following the heating, a seed rod is inserted in the melted material as the material is being cooled to crystallize into a boule. Following the growth process, each boule is rigorously inspected by using polarized lighting and magnification to find imperfections, such as bubbles, dislocations and granular deposits within the crystal.

We then drill the resulting boules into cylindrical cores using our custom high-precision crystal orientation equipment and proprietary processes. We use wire saws to slice each core into wafers of precise size and shape. These wafers are then pre-polished using precision lapping and edge-grinding equipment and then are ready to be polished into epitaxial wafers. All of these processes are performed in clean environments to reduce the chance of crystal contamination. Epi-polishing and wafer cleaning are performed in Class 10,000 and Class 100 clean-room environments, respectively.

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We are dedicated to quality assurance throughout our entire operation. We employ detailed material traceability from raw material to finished product. Our quality system is certified as ISO9001:2000, and we have in-house expertise at the Six Sigma Black Belt level.

All of our long-lived assets are located in the U.S. and Malaysia.

SALES AND MARKETING

We market and sell our products through our direct sales force to customers in Asia, Australia, North America and Europe. Our direct sales force includes experienced and technically sophisticated sales professionals and engineers who are knowledgeable in the development, manufacturing and use of sapphire substrates, windows and other optical materials. Our sales staff works with customers during all stages of the substrate manufacturing process, from developing the precise composition of the substrate through manufacturing and processing the substrate to the customer s specifications.

A key component of our marketing strategy is developing and maintaining strong relationships with our customers, especially at the senior management level. We achieve this by working closely with our customers to optimize our products for their production processes. In addition, we are able to develop long-term relationships with key customers by offering product specification assistance, providing direct access to enable them to evaluate and audit our operations, delivering high-quality products and providing superior customer service. We believe that maintaining close relationships with senior management and providing technical support improves customer satisfaction and provides us with a competitive advantage when selling our products.

In order to increase brand recognition of our products and of Rubicon in general, we publish technical articles, advertise in trade journals, distribute promotional materials and participate in industry trade shows and conferences.

CUSTOMERS

Our principal customers are semiconductor device manufacturers and wafer polishing companies. A substantial portion of our sales have been to a small number of customers. In 2013 and 2012, our top two customers accounted for approximately 44% and 67% of our revenue, respectively. In 2011, our top three customers accounted for approximately 69%. Although we are attempting to diversify and expand our customer base, we expect our sales to continue to be concentrated among a small number of customers. However, we also expect that our significant customers may change from time to time. In 2013, sales to Peregrine Semiconductor Corporation and Nanjing J-crystal Photoelectric Technology Co. represented approximately 27% and 17% of our revenues, respectively. In 2012, sales to Peregrine Semiconductor Corporation and LG Innotek represented approximately 38% and 29% of our revenues, respectively. In 2011, sales to LG Innotek, Tera Xtal Technology Corp. and Crystalwise Technology represented approximately 38%, 19% and 12% of our revenues, respectively. No other customer accounted for 10% or more of our revenues during 2013, 2012, or 2011.

In 2013, 60% of our sales were made to customers in Asia, 25% of our sales were made to customers in Australia, 11% of our sales were made to customers in North America and 4% of our sales were made to customers in Europe. In 2012, 48% of our sales were made to customers in Asia, 19% of our sales were made to customers in Australia, 17% of our sales were made to customers in North America and 16% of our sales were made to customers in Europe. In 2011, 87% of our sales were made to customers in Asia, 9% of our sales were made to customers in North America and 4% of our sales were made to customers in Europe. Our customer supply agreements tend to be for short periods of time, typically 90 days. Therefore, fluctuations in demand could cause our quarterly revenue to vary significantly. Our standard arrangement with most customers includes payment terms.

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INTELLECTUAL PROPERTY

Our ability to compete successfully depends upon our ability to protect our proprietary technologies and other confidential information. We rely primarily upon a combination of trade secret laws and non-disclosure agreements with employees, customers and potential customers to protect our intellectual property. We have five patents and twelve pending patent applications with the U.S. Patent and Trademark Office, mostly covering aspects of our core production, wafer grinding and lapping technologies. However, we believe that factors such as the technological and innovative abilities of our personnel, the success of our ongoing product development efforts and our efforts to maintain trade secret protection are more important than patents in maintaining our competitive position. We pursue the registration of certain of our trademarks in the U.S. and currently have three registered trademarks.

COMPETITION

The markets for high-quality sapphire products are very competitive and have been characterized by rapid technological change. The products we produce must meet certain demanding requirements to succeed in the marketplace. Although we account for a significant percentage of the total market volume today, we face significant competition from other established providers of similar products as well as from new and potential entrants into our markets.

We have several competitors that compete directly with us. In recent years, certain companies that formerly competed with us only in sapphire cores have entered into wafer polishing and are trying to establish positions in the large-diameter wafer market. These companies tend to focus on providing core and as-cut products rather than offering polished products. There are a limited number of companies that are substantially larger than we are that compete with us in a relatively small segment of their overall business. These larger companies tend to focus on providing polished products to customers rather than providing core, as-cut and as-ground products.

We believe that the key competitive factors in our markets are:

- consistently producing high-quality products in the desired size, orientation and finish;
- driving innovation through focused research and development efforts;
- possessing sufficient supply capacity to meet end-market customer demands;
- offering solutions through collaborative efforts with customers;
- pricing; and
- providing a low total cost-of-ownership for customers.

Although we face significant competition, we believe that our proprietary ES2 crystal growth technology, our fabrication and polishing capabilities and our business practices allow us to compete effectively on all of the above factors.

ENVIRONMENTAL REGULATION

In our manufacturing process, we use water, oils, slurries, acids, adhesives and other industrial chemicals. We are subject to a variety of federal, state and local laws regulating the discharge of these materials into the environment or otherwise relating to the protection of the environment. These include statutory and regulatory provisions under which we are responsible for the management of hazardous materials we use and the disposition of hazardous wastes resulting from our manufacturing processes. Failure to comply with such provisions, whether intentional or inadvertent, could result in fines and other liabilities to the government or third parties, injunctions requiring us to suspend or curtail operations or other remedies, which could have a material adverse effect on our business.

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EMPLOYEES

As of December 31, 2013, we had 292 full-time employees, of which 264 work in technology and operations. None of our employees are represented by a labor union. We consider our employee relations to be good.

OTHER INFORMATION

You may access, free of charge, our reports filed with the SEC (for example, our Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and our Current Reports on Form 8-K and any amendments to those forms) indirectly through our Internet website (www.rubicontechnology.com). Reports filed with or furnished to the SEC will be available as soon as reasonably practicable after they are filed with or furnished to the SEC. Alternatively, if you would like a paper copy of any such SEC report (without exhibits) or document, write to Investor Relations, Rubicon Technology, Inc., 900 East Green Street, Bensenville, Illinois 60106, and a copy of such requested document will be provided to you, free of charge. The information found on our website is not part of this or any other report filed with or furnished to the SEC.

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ITEM 1A. RISK FACTORS

You should carefully read the risk factors set forth below, together with the financial statements, related notes and other information contained in this Annual Report on Form 10-K. Our business is subject to a number of important risks and uncertainties, some of which are described below. The risks described below, however, are not the only risks that we face. Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial may also impair our business operations. Any of these risks may have a material adverse effect on our business, financial condition, results of operations and cash flows. Please refer to the discussion of forward-looking statements on page one of this Annual Report on Form 10-K in connection with your consideration of the risk factors and other important factors that may affect future results described below.

Our results of operations, financial condition and business will be harmed if we are unable to effectively match our capacity with customer demand.

The markets we serve are emerging markets. As a result, there can be significant fluctuations in demand for our products, which may result in our manufacturing facilities being underutilized from time to time, which can negatively impact our gross margins and overall business. Currently, there is limited demand for six-inch sapphire wafers. As a result, we currently are not fully utilizing our manufacturing facilities. We expect this underutilization of some of our manufacturing facilities to continue into the first half of 2014. There can be no assurance that such sudden market changes will not occur again in the future adversely affecting our profitability.

We plan to continue to expand our production capacity as demand for our products strengthens. Our capacity expansion involves significant risks, including the availability of capital equipment and the timing of its installation, availability and timing of required electric power, management of expansion costs, timing of production ramp-up, qualification of our new equipment and demands on management s time. If our business does not grow fast enough to utilize this new capacity effectively, our business and financial results could be adversely affected. Conversely, delays in expanding our manufacturing capacity could impact our ability to meet future demand for our products. As a result, we might not be able to fulfill customer orders in a timely manner, which could adversely affect our customer relationships and operating results. Moreover, our efforts to increase our production capacity may not succeed in enabling us to manufacture the required quantities of our products in a timely manner or at the gross margins that we achieved in the past. There can be no assurance that we will be able to successfully reach our production, timing and cost goals for our expansion.

We have incurred significant losses in prior periods and may incur losses in the future.

We have incurred significant losses in prior periods. As of December 31, 2013, we had an accumulated deficit of $127.6 million. While we had net income of $38.1 million in 2011 and $29.1 million in 2010, we incurred net losses of $30.4 million, $5.5 million, $9.6 million and $2.9 million in 2013, 2012, 2009 and 2007, respectively. There can be no assurance that we will have sufficient revenue growth to offset expenses or to achieve profitability in future periods.

The average selling prices of products in the LED supply chain have historically been volatile.

Historically, our industry has experienced volatility in product demand and pricing. Changes in average selling prices of our products as a result of competitive pricing pressures, increased sales discounts and new product introductions by our competitors could have a significant impact on our profitability. Although we attempt to optimize our product mix, introduce new products, reduce manufacturing costs and pass along certain increases in costs to our customers in order to lessen the effect of decreases in selling prices, we may not be able to successfully do so in a timely manner and our results of operations and business may be harmed. In addition, rapid changes in market conditions have, at times, caused financial hardship for our customers, resulting is some write-offs of our accounts receivable. While we monitor the financial health of our customers, rapid changes in market conditions may result in additional accounts receivable write-offs in the future which could affect our results of operations.

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If LED lighting does not achieve greater market acceptance, or if alternative technologies are developed and gain market traction, prospects for our growth and profitability would be limited.

Our future success largely depends on increased market acceptance of LED lighting. Approximately 59% and 49% of our revenue during 2013 and 2012, respectively, was from sales of our products for use in the manufacture of LED products. Potential customers for LED lighting systems may be reluctant to adopt LED lighting as an alternative to traditional lighting technology because of its higher initial cost and relatively low light output per unit in comparison with the most powerful traditional lighting devices. In addition, our potential customers may have substantial investments and know-how related to their existing lighting technologies, and may perceive risks relating to the novelty, complexity, reliability, quality, usefulness and cost-effectiveness of LED products compared to other lighting sources available in the market. If acceptance of LED lighting does not increase significantly, then opportunities to increase our revenues and operate profitably would be limited.

Moreover, if effective new sources of light other than LED devices are developed, our current products and technologies could become less competitive or obsolete. Any of these factors could have a material and adverse impact on our growth and profitability.

If the acceptance of newly developed products does not meet our expectations, or our efforts to enhance existing products are not successful, our future operating results may be harmed.

The development of new products may require substantial investment in development efforts and equipment. If our newly developed products, such as our PSS product line, do not achieve market acceptance, we may be unable to generate anticipated revenue and our operating results could be harmed.

Our continuing efforts to enhance our current products and to develop new products involve several risks, including:

- our ability to anticipate and respond in a timely manner to changes in customer requirements;
- the significant research and development and equipment investment that we may be required to make before market acceptance of a particular new or enhanced product;
- the possibility that the industry may not accept our new or enhanced products after we have invested a significant amount of resources in development; and
- competition from new technologies, processes and products introduced by our current and/or future competitors.

The technology used in the LED industry continues to change rapidly, and if we are unable to modify our products to adapt to future changes in the LED industry, we will be unable to attract or retain customers.

We do not design or manufacture LEDs. Our ability to expand into new applications in the LED market depends on continued advancement in the design and manufacture of LEDs by others. The LED industry has been characterized by a rapid rate of development of new technologies and manufacturing processes, rapid changes in customer requirements, frequent product introductions and ongoing demands for greater functionality. Our future success will depend on our ability to develop new products for use in LED applications and to adjust our product specifications, such as our previous development of larger diameter wafers, in response to these developments in a timely manner. If our development efforts are not successful or are delayed, or if our newly developed products, such as PSS, do not achieve market acceptance, we may be unable to attract or retain customers and our operating results could be harmed. In addition, although sapphire is currently the preferred substrate material for HB white, blue and green LED applications, we cannot assure you that the LED market will continue to demand the performance attributes of sapphire. Silicon carbide is another substrate material currently used for certain LED applications, including some that also use sapphire substrates. Other substrates being investigated and used in research and development for certain LED applications are silicon, aluminum nitride, zinc oxide and bulk gallium nitride. If sapphire is displaced as the substrate of choice for certain LED applications, our financial condition and results of operations would be materially and adversely affected unless we were able to successfully offer the competing substrate material.

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If the development and acceptance of our products for the SoS RFIC market do not meet our expectations, our future operating results may be harmed.

The level of market acceptance of our SoS RFIC products may impact our future operating results. Our success in the SoS RFIC market depends on a number of factors, including the success of our customers products in current applications and the acceptance of SoS RFIC products for newly targeted applications.

In addition, it is possible that other solutions, such as silicon-on-insulator, may become preferred over SoS. We cannot assure you that the RFIC market will continue to require the performance attributes of SoS solutions. If our products are not accepted more broadly in the RFIC market, our results of operations and business may be harmed.

We depend on a few customers for a major portion of our sales and our results of operations would be adversely impacted if they reduced their order volumes.

Historically, we have earned, and believe that in the future we will continue to earn, a substantial portion of our revenue from a small number of customers. In 2013 and 2012, our top two customers accounted for approximately 44% and 67% of our revenue, respectively. If we were to lose one of our major customers or have a major customer significantly reduce its volume of business with us, our revenues and profitability would be materially reduced unless we are able to replace such demand with other orders promptly. We expect to continue to be dependent on our significant customers, the number and identity of which may change from period to period.

In addition, we generally sell our products on the basis of purchase orders. Delays in product orders could cause our quarterly revenue to vary significantly. A number of factors could cause our customers to cancel or defer orders, including interruptions to their operations due to a downturn in their industries, natural disasters, delays in manufacturing their own product offerings into which our products are incorporated, securing other sources for the products that we manufacture or developing such products internally.

We are subject to risks from international sales that may harm our operating results.

In 2013 and 2012, revenue from international sales was approximately 89% and 83%, respectively, of our total revenue. We expect that revenue from international sales will continue to constitute a significant portion of our total revenue for the foreseeable future. Our international sales are subject to a variety of risks, including risks arising from:

- trading restrictions, tariffs, trade barriers and taxes;
- differing intellectual property laws;
- economic and political risks, wars, acts of terrorism, political unrest, pandemics, such as a recurrence of the SARS outbreak or avian flu, boycotts, curtailments of trade and other business restrictions;
- the difficulty of enforcing contracts and collecting receivables through some foreign legal systems;
- unexpected changes in regulatory requirements and other governmental approvals, permits and licenses;
- import and export restrictions;

sales variability as a result of transacting our foreign sales in U.S. dollars as prices for our products become less competitive in countries with currencies that are low or are declining in value against the U.S. dollar and more competitive in countries with currencies that are high or increasing in value against the U.S. dollar; and

periodic foreign economic downturns.

Our future success will depend on our ability to anticipate and effectively manage these and other risks associated with our international sales. Our failure to manage any of these risks could harm our operating results.

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Our manufacturing processes may be interrupted or our production may be delayed if we cannot maintain sufficient electrical supply, which could adversely affect our business, financial condition and operating results.

Our manufacturing process requires a stable source of electricity. From time to time, we have experienced limited disruptions in our supply of electricity. Such disruptions, depending upon their duration, could result in a significant drop in throughput and yield of in-process crystal boules and create delays in our production. Although we use generators and other back-up sources of electricity, these replacement sources of electricity are only capable of providing effective back-up for limited periods of time. We cannot assure you that we will be successful in avoiding future disruptions in power or in mitigating the effects of such disruptions. Any material disruption in electrical supply could delay our production and could adversely affect our business, financial condition and operating results.

Our gross margins and profitability may be adversely affected by energy costs.

Most of our power consumption takes place in our crystal growth facilities in the U.S. Electricity prices could increase due to overall changes to the price of energy due to conditions in the Middle East, natural gas shortages in the U.S. and other economic conditions and uncertainties regarding the outcome and implications of such events. Once our current agreements expire, if electricity prices increase significantly, we may not be able to pass these price increases through to our customers on a timely basis, if at all, which could adversely affect our gross margins and results of operations.

Our contracts for electricity require us to purchase certain minimum amounts in order to retain the pricing under the contract. If the amount we use is less than the required minimum, the difference is resold at the then prevailing market price and, if the resale price is lower than our contract price, we will experience a loss on that resale, which could adversely affect our gross margins and operating results.

Our future operating results may fluctuate significantly, which makes our future results difficult to predict and could cause our operating results for particular periods to fall below expectations.

Our revenues and operating results have fluctuated in the past and are likely to fluctuate in the future. These fluctuations are due to a number of factors, many of which are beyond our control. These factors include, among others:

- timing of orders from and shipments to major customers;
- the gain or loss of significant customers;
- fluctuations in gross margins as a result of changes in capacity utilization, product mix or other factors;
- market acceptance of our products and our customers products;