# ZECOTEK

# Zecotek Photonics Inc.



LFS Scintillation Crystals



**MAPD Photo-Detectors** 



**Detector and Scintillator Arrays for PET** 





Components for PET Medical Scanners & the Large Hadron Collider

Management's Discussion & Analysis

For the quarter ended January 31, 2018

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#### MANAGEMENT DISCUSSION AND ANALYSIS

# **April 2, 2018**

This Management's Discussion and Analysis ("MD&A") of Zecotek Photonics Inc. (the "Company") is dated April 2, 2018. This MD&A should be read in conjunction with the Company's unaudited consolidated interim financial statements for the three months ended January 31, 2018 and should also be read in conjunction with the audited consolidated financial statements and MD&A for the year ended July 31, 2017. The unaudited interim consolidated financial statements are prepared in accordance with International Financial Reporting Standards. All dollar amounts are expressed in Canadian dollars except where noted. The parent company's accounts are maintained in Canadian dollars. The business activities of the Company, carried out through its subsidiaries in Singapore are conducted primarily in Singapore dollars. The rate of exchange on January 31, 2018 as reported by the Bank of Canada, for the conversion of one Singapore dollar into Canadian dollars was \$0.9383.

# **Forward-Looking Statements**

This discussion may contain forward-looking statements, including statements regarding the business and anticipated financial performance of the Company, which involve risks and uncertainties. These risks and uncertainties may cause the Company's actual results to differ materially from those contemplated by the forward-looking statements. Factors that might cause or contribute to such differences include, among others, Company's ability to successfully complete new product development along the timelines expected; the Company's need for funds to achieve its goals and uncertainties as to the availability and cost of funding; uncertainty as to the continued and future demand for the Company's products; the development of competing technologies and the possibility of increased competition; and other economic trends and conditions in the markets that the Company and its customers serve; and the effect of the risks associated with technical difficulties or delays in product introductions, improvements, implementation, product development, product pricing or other initiatives of the Company and its competitor. All other companies and products listed herein may be trademarks or registered trademarks of their respective holders.

# **Company Overview**

Zecotek Photonics Inc. develops leading-edge photonics technologies and products for commercial and research applications in many different markets: medical, bio-science, high-energy physics, pharmaceutical research, material processing, engineering and industrial design and multi-media.

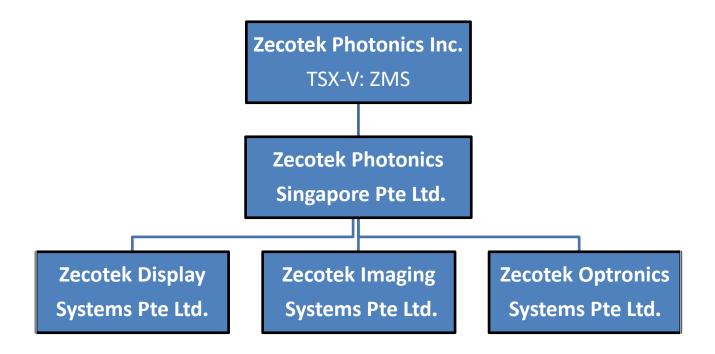
Founded in 2004, the Company has focused on building shareholder value by securing a strong intellectual property portfolio, completing the development of unique technologies for targeted markets and pursuing the optimum commercialization strategy.

Zecotek Photonics Inc. has three operational subsidiary companies: Zecotek Imaging Systems Pte Ltd. (ZIS); Zecotek Display Systems Pte Ltd. (ZDS); and Zecotek Optronics Systems Pte Ltd. (ZOS). All of the subsidiary companies are incorporated in Singapore and owned by Zecotek Photonics Singapore Pte Ltd., a holding company. Each operational subsidiary is autonomous, in the sense that each has its own patent portfolio and management team.



Zecotek's corporate headquarters is located in Vancouver, B.C. It is a Canadian public company trading on the TSX Venture Exchange under the symbol "ZMS" and on the Frankfurt Stock Exchange under the trading symbol "W11". The Company's website is www.zecotek.com.

#### Company Structure



#### Zecotek Imaging Systems Pte Ltd. (ZIS)

ZIS is commercializing photonic technologies that offer both superior performance and economic advantages over competing technologies. The LFS crystal and the MAPD/T are central components for high-resolution PET medical scanners for diagnostics and treatment, and high energy physics experiments, such as the Large Hadron Collider at CERN, Switzerland and the Linear Accelerator at Fermi Lab, USA. ZIS is the only organization in the World that owns the three primary elements required for the manufacture of high resolution PET medical scanning devices: LFS crystal arrays, MAPD photo-detector arrays, and fast electronics. It has developed its own high performance integrated detector module (IDM) using its own high performance imaging components.

With the advancement of PET scanning diagnostics and its relevance to early treatment, PET technology has become indispensable to hospitals and clinics worldwide, especially in the fast growing BRIC economies of Brazil, Russia, India and China. New PET scanning technology requires denser, faster and brighter crystals, and OEMs are looking to Lutetium Oxide based scintillation crystals, compact solid-state photo detectors and faster electronic readout systems for the next generation of PET scanners. Time of Flight configurations allow for higher resolution and silicon based solid-state photo detectors present the possibility of integrating PET and MRI technologies into a single scanning device. Furthermore, major OEMs have recognized the advantages of using fully integrated





detector modules made of an array of crystals, an array of photo-detectors, readout electronics and a data acquisition board.

While the adoption of new technologies by OEMs does take time, revenues from the sale of crystals are growing as OEMs and scientific organizations have accepted and endorsed the advantages of Lutetium Oxide based scintillation crystals and other photonic technologies.

With Chinese patents in place and a manufacturing partner based in Beijing, ZIS identified China as an important PET market. In March 2016 a major medical OEM based in China selected LFS scintillation crystals for a new line of high resolution positron emission tomography (PET) medical imaging devices.

ZIS has also initiated the production and delivery of LFS crystal arrays specifically designed for mini-PET scanning devices, used for the development of pharmaceutical drugs. Small PET scanners work well with existing phototubes but require new, faster and brighter crystals such as the Zecotek's LFS crystals.

ZIS is working with the University of Washington in Seattle, on the integration of PET/MRI for imaging and pharmaceutical research. The focus of the partnership is the integration of a compact design for imaging of specific organs while offering an ideal diagnostic modality. One such device is a cost effective, high resolution neurological PET scanner "NeuroPET" for the detection and treatment of neurological disorders, specifically Alzheimer, Parkinson's and later age Dementia.

The scientific team at ZIS continues to work closely with CERN after the successful test of custom designed LFS-3 plates, due to the LFS-3 plate's density, stopping power, fast decay time, very good energy resolution, and radiation hardness. With a break-through plate design, experiments using LFS-3 plates can benefit from reduced labour and re-calibration costs associated with single crystal forms and reduced maintenance costs due to fewer interruptions associated with the maintenance and refitting of damaged crystals.

The scientific team continues to advance both crystals and photo detectors and has recently introduced LFS-8 and micro-pixel avalanche photo transistors, MAPT. The LFS-8 early samples have shown a higher performance than its sibling LFS-3, with the LFS-8 being two times faster. The MAPT technology has shown at least 10 times shorter photo-response duration with 10 times as high photo-response signal in comparison to known analogues.

#### Zecotek Display Systems Pte Ltd. (ZDS)

ZDS scientists have developed and demonstrated a colour, 32-inch 3D display prototype that offers multiple viewers with true volumetric visualization while exhibiting depth and parallax without the use of external glasses. ZDS's Real-Time 3D2D Display is a novel, patented display system for the visualization of images and data, which has been developed in-house by Zecotek's scientific team and technical staff and does not rely on any licensed intellectual property. All intellectual property is owned and controlled by Zecotek. The Zecotek 3D display technology has been granted US and Australian Patents under PCT.

Based on the auto stereoscopic principle, but with patent pending innovation, it represents a new generation of 3D displays. It has the capability of simultaneously presenting to multiple users both 3D and 2D images on the



same screen with separate views and at different viewing angles. Its design provides for multi-users, multi-views, freedom of movement, high resolution in both 3D and 2D modes, superior image dynamic range in 2D mode, 2D and 3D simultaneous displays, common brightness, compatibility with existing applications and cost competitiveness at all stages of adoption and levels of application.

The 3D display system provides for viewing a volumetric representation without eye strain. The viewing of such 3D images does not require the use of any supplementary means such as glasses, does not drastically limit the position of the viewer with respect to the display, and allows simultaneous viewing of the 3D display by many viewers from a relatively wide field of view.

The Company is involved in discussions with certain major electronics companies to co-develop an OLED/LED (organic light emitting diode) based, flat screen, glasses-free, true 3D HD television. Price point, concerns about visual health, and an overall lack of quality in the current 3D televisions requiring glasses, have all contributed to a declining consumer market. Zecotek's 3D display offers a realistic, HD, glasses free, multi-viewer 3D experience and now OLED/LED based flat screen display technologies are now meeting higher switching speeds necessary to support Zecotek's 3D display technology.

An advanced prototype of the 3D display has been shipped to a group in Russia for integration to a commercial product. A joint venture with the group is being structured, to concentrate on market demand from homeland security including airports, harbours, and government buildings. The program uses realistic 3D screening of hidden objects and precise identification of parts. A software combines all possible combinations of concealed parts to rule out potential weapons or triggers, and is being developed for speed of data and images reconstruction.

#### Zecotek Optronics Systems Pte Ltd. (ZOS) (formerly Zecotek Laser Systems Pte Ltd. (ZLS))

ZLS has a joint laboratory with Inversion Fiber/Novolaser for the integration of tuneable fiber lasers in the visible spectrum. The tuneable visible fiber laser technology platform is now complete and lasers based on the platform have a large area of application in medicine, fundamental research, inspection and other industries. Zecotek is revising this division's technology portfolio and is re-structuring its business activities. Management is opting for ready technologies geared to cater for the ever expanding security market demands.

#### Zecotek Key Product Summary

- Patented LFS family of advanced scintillation materials;
- Patent-pending MAPD solid-state high-sensitivity photo-detector (Micro-pixel Avalanche Photo Diode);
- Patented and patent-pending DOI-enabled scintillation detectors for PET imaging;
- Patented and patent-pending Mini PET/MRI technology;
- Patented and patent-pending 3D/2D auto-stereoscopic multiple-view display;
- Patented and patent-pending widely tunable fiber lasers in the visible spectrum.

#### **Patent Portfolio**

As a result of internal technology development, patent acquisitions and licensing partnerships, the Company's patent portfolio has continued to grow in numbers and technological diversity. As of July 31, 2017, Zecotek owned title to or controlled more than 50 patents and applications. The following table lists the key patents in Zecotek's patent portfolio.



Key Technology	Patent/App. No	Date Filed	Jurisdiction	Status
The state of the s	7,944,465	27-02-06	US, CA, AU	Granted
	8,243,127	27-06-07	US	Granted
	PCT/IB2007/003309	07-11-07	PCT, IN, JP	Pending
	201070065	07-11-07	EA (RU)	Granted
	10-2010-7001958	07-11-07	KR	Granted
2D 1'1.	EP 2177041	07-11-07	DE, GB, FR, NL	Granted
3D displays	200780100317.0	07-11-07	CN	Granted
	9,076,359	16-05-11	US	Publ. pending
	9,055,288	11-07-12	US	Granted
	PCT/IB2013/000812	15-01-13	PCT, US, JP, EP, CN, IN	Pending
	14/167,512	29-01-14	US	Pending
	14/167,544	29-01-14	US	Pending
	7,132,060	21-07-05	US	Granted
	2242545	04-11-03	RU	Granted
	PCT/RU2004/000094	12-03-04	PCT, AU, CA, CN, EA, DE, FR, GB, JP, NL	Granted
LFS scintillation	1493/KOLNP/2006	12-03-04	IN	Pending
crystals	PCT/CA2013/000349	26-04-13	US, CA, AU, CN, KR, EP, EA, IN, JP	Pending
	14/051,328	10-10-13	US	Pending
	14/272,405	07-05-14	US	Pending
	14/295,301	02-10-14	US	Pending
	2316848	01-06-06	RU	Granted
	PCT/RU2007/000287	31-05-07	PCT, AU, CA, EP, IN, MY	Pending
	148413	31-05-07	SG	Granted
	200780024920.5	31-05-07	CN	Granted
Semiconductor photo-	8,742,543	20-02-08	US	Granted
detectors (MAPD)	5320610	31-05-07	JP	Granted
detectors (MAFD)	5666636	31-05-07	JP	Granted
	10-2008-7032265	31-05-07	KR	Granted
	13/609,136	10-09-12	US	N. of Allowance
	14/292,221	30-05-14	US	N. of Allowance
	14/459,136	19-02-15	US	Pending
PET imaging technologies	7,956,331	27-10-08	US	Granted
	8,003,948 B2*	03-11-08	US	Granted
	PCT/US2008/082273*	03-11-08	PCT, AU, CA, EP, JP, KR, CN	Pending
	13/125,966*	22-10-09	US	N. of Allowance
	8,431,904*	26-10-09	US	Granted
	8,309,932*	18-08-11	US	Granted
	14/195,735	14-09-11	US	N. of Allowance
	13/609,136	10-09-12	US	Pending
	2013-528480	14-03-13	JР	Pending
X7: '1.1 C'1 1	12/182,951	30-07-08	PCT, US	Pending
Visible fibre lasers	2006119198	02-06-06	RU	Granted

<sup>\*</sup> Zecotek, as principal financier and development partner of imaging components with the University of Washington, has the exclusive license rights for improved data-processing electronics for new generation PET scanning devices.

Zecotek's research and development success depends on having a quality portfolio of patents, which are not only technically valuable, but are properly filed and maintained in appropriate jurisdictions. The Company devotes a



significant effort to the administration of its portfolio, ensuring that any applications are duly filed in appropriate jurisdictions. It maintains carefully balanced mix of internal and external patent administration.

#### **Corporate Strategy**

Since Zecotek's formation in 2004, it has developed and acquired a significant technology based intellectual property portfolio protected by patents issued or filed worldwide. Furthermore, the Company has integrated a number of technologies into value-added components and products which it has manufactured in limited production runs.

Zecotek's core business strategy is to commercialize photonic products and technologies through strategic alliances with major corporations. The central objective is to enter growth markets with products featuring competitive costs and performance superiority – leading to above average profits and shareholder returns.

Zecotek brings leading-edge photonics technologies to alliances while corporate partners bring their existing product development, marketing, manufacturing and distribution resources. The product delivery vehicle will be generally a joint venture, structured to clearly identify each partner's contributions, efficiently manage project costs, preserve each partner's IP rights, enable investment by fourth parties and minimize time to market.

#### **Recent Business Activities**

#### Zecotek China

On January 31, 2018, Zecotek closed a previously announced divisional equity financing of \$5 million. The financing was completed by selling a 6.67% equity interest in a newly formed, wholly owned subsidiary Zecotek Imaging China Ltd. for net proceeds of \$5 million. The Company secured the divisional investment with an industrial business group based in China, which also made a significant investment in a non-brokered private placement. The divisional financing was based on the appraised pre-commercialized value of Zecotek's patented LFS scintillation crystal technology of approximately \$75 million.

On July 17, 2017, Zecotek appointed Mr. Thomas Lau as Business Development Director of Zecotek China. Mr. Lau is a native of China and brings more than 20 years of experience working in the photonics industry in China as a senior business development and operating executive. As Business Development Director he has been charged with managing an aggressive expansion strategy for Zecotek's patented photonics technologies within medical and non-medical industry sectors in China.

On June 30, 2017, Zecotek provided an update to the forming of its new China based subsidiary Zecotek China Ltd. The formation of the new subsidiary has accelerated the potential adoption of the LFS by medical scanner developers as well as non-medical OEMs in China. Zecotek China is working closely with new medical and non-medical OEMs. Testing of the LFS crystals have been completed and we expect to receive purchase orders in the near future.

On May 16, 2017, Zecotek announced the forming of a new subsidiary: Zecotek China. The wholly owned subsidiary will operate in the Shanghai Free Trade Zone and as a division of Zecotek Imaging Systems. The subsidiary will be setup to conduct business with greater efficiency and ease within the Chinese market place. Certain tax incentives and infrastructure exist within the local business environment that are not available to Zecotek Imaging Systems. Zecotek China will be able to work more closely with EBO Optoelectronics and its



customers both in and out of China, and be able to take advantage of favorable trade conditions thereby reducing the cost of production and improving margins.

#### Shanghai EBO Crystal Assembly Company

On March 9, 2017, the Shanghai EBO Crystals Assembly Company was appointed exclusive distributor of its patented LFS scintillation crystals for all sales in China, and EBO agreed to use only LFS scintillation crystals in arrays for all new PET medical scanners. No competing crystals will be used.

On January 25, 2017, Zecotek announced a LFS scintillation crystal supply agreement with the Shanghai based company EBO Optoelectronics. The agreement is to supply over \$21 million worth of scintillation crystals over the next three years. The agreement stipulates that the supply of the LFS crystals will continue a yearly basis after the initial three-year period, unless otherwise agreed to by both parties. Zecotek will become the main supplier of Lutetium silicate based scintillation crystals to EBO.

The Shanghai EBO Crystals Assembly Company is the largest crystal array producer and supplier in China.

#### Sales/Partnerships

On March 15, 2018, Zecotek announced a marketing and distribution agreement with the Shanghai Fortune Techgroup Co. Ltd., a China-based authorized distributor of integrated circuits and related optoelectronic products, to generate sales of its patented LFS crystals to customers in China.

On October 30, 2017, Zecotek announced that a well-established life sciences OEM based in Europe has selected LFS scintillation crystals for a new line of high resolution positron emission tomography (PET)/ computed tomography (CT) medical imaging devices. Final qualifying phase data has been sent to the OEM, prior to the execution of a long-term supply engagement as the OEM prepares for the introduction of a new line of specialized PET/CT medical systems to be distributed globally.

On October 25, 2017, Zecotek announced that its LFS scintillation crystals have been successfully assessed by the Institute of High Energy Physics (IHEP), the largest research laboratory in Beijing, China. Due to the positive results, IHEP has committed to use LFS crystals in current and future experiments. Contractual discussions for a long-term contract are in process.

On August 16, 2017, Zecotek announced that it has received an order for its patented LFS scintillation crystals from a medical imaging device manufacturer based in the United States for use in a newly developed neuroPET scanner. PET medical scanning has been successful at identifying functional abnormalities with brain tissues. New and more specialized PET imaging devices are being developed to provide greater functional information in the detection of tumors and diseased tissue, measurement of cellular and tissue metabolism, blood flow, and the evaluation of patients who have seizures, memory disorders such as Alzheimer and Parkinson, and mood abnormalities.

On May 30, 2017, a tier 1 positron emission tomography (PET) OEM in China ordered \$100,000 of LFS scintillation crystals for a PET medical scanning configuration. The order was made through the Shanghai EBO Optoelectronics partnership and represents a second Chinese OEM to order LFS scintillation crystals.

On May 24, 2017, four prestigious high tech institutions, including the University of California, ordered LFS scintillation crystals for both medical imaging and high energy physics experiments.



On May 18, 2017, Zecotek announced that it was moving forward to jointly develop a large area, commercially ready radiation detection unit with a major OEM developing radiation monitoring and detection devices.

On March 30, 2017, a second major European automobile manufacturer approached the Company to discuss integrating Zecotek's 3D technology into a brand specific 3D head-up display (HUD) and entertainment console.

In December 2016 a major European automobile manufacturer had approached management to initiate discussions around developing a 3D head-up display (HUD) and entertainment console for a line of luxury automobiles. Zecotek's patented 3D auto stereoscopic display technology is superior to existing HUD systems because it does not require eye tracking and it provides a deeper field of view for both the driver and the passenger, as they are able to see pictures with the same relative primary resolution.

#### **Patents**

In November 2017 the Chinese State Intellectual Property Office Patent Office issued a certificate of invention for Chinese Patent No. ZL2014800563565 for its solid-state Micro-channel Avalanche Photodiode/Transistor (MAPD/T) photo detector. The Company continues to strengthen its patent portfolio specific to imaging technology and associated components of positron emission tomography (PET) medical scanners in important jurisdictions like China.

In June 2017, Zecotek Imaging Systems Pte. Ltd., received a notice of allowance in China for its advanced formulation of its patented LFS scintillation crystals. This is the second patent in a series of worldwide, pending patents, for multi-doped lutetium oxide based scintillators having improved photonic properties, known as, "LFS-M".

#### Hamamatsu Photonics

Hamamatsu has purchased over \$3 million of LFS scintillation crystal purchase orders for use in PET medical devices. On a monthly basis Zecotek delivers LFS crystals to Hamamatsu for integration in IDM modules for PET medical scanners. While the PET OEMs have committed to take delivery of the crystals, not all have finalized the configuration specifications for the detector modules and therefore a quantity of crystals are awaiting shipment schedules. The crystals boules have been grown and await instructions on how the individual pieces will be specifically cut.

Zecotek continues to ship LFS crystals to Hamamatsu for integration in IDM modules for PET medical scanners.

# The European Organization for Nuclear Research (CERN)

CERN is one of the world's largest and most respected centres for scientific research and has become a very important partner of Zecotek. In 2013 CERN scientists confirmed the discovery of the Higgs Boson, a new subatomic particle. As CERN pushes into this new frontier of science, new experiments are required to determine the particle's properties and its true form. High energy scintillation crystals with high radiation hardness are paramount for the success of the next stage of experiments and Zecotek's imaging technologies are playing an increasingly important role.

There are six CERN experiments using Zecotek's solid-state MAPD photo detectors:

- The Alice Experiment,
- The NA612 Experiment,



- The Swiss Federal Institute of Technology,
- The Joint Institute for Nuclear Research,
- The Compact Muon Solenoid Experiment,
- The Compass Experiment.

Zecotek and Hamamatsu are also working closely with CERN on the adoption of the LFS crystal as a strong candidate to replace the old material. The LFS's high radiation hardness is a prime and essential feature in the design considerations for the next high energy levels required in the Large Hadron Collider experiments.

#### 3D Displays

On November 15, 2017, Zecotek announced that a second major European automobile manufacturer will integrate its 3D technology into a brand specific 3D head-up display (HUD) for consumer use. Zecotek's 3D HUD technology is attractive to leading auto manufactures because it is compact, does not require eye tracking and provides a deeper field of view than existing HUD displays as well as a platform for rich content.

On July 5, 2017, Zecotek signed a joint development agreement with one of Germany's leading automobile manufacturers, to develop a brand specific, 3D head-up display (HUD) and entertainment console. As previously announced on December 14, 2016, and March 30, 2017, Zecotek's 3D display system is being sought by a number of German and other European automobile manufacturers.

#### Research & Development & Other Activities

On March 12, 2018, Zecotek introduced a novel wireless full duplex single frequency ASIC microchip to be used in conjunction with the solid-state MAPT photo detectors in high resolution positron emission tomography (PET) medical scanners. Healthcare is one of the top five segments of the global application specific integrated circuit market.

Zecotek's LFS crystal enhancement program has shown substantial improvement resulting in a new version of the crystal: LFS-8. The LFS-8 is two times faster than the current LFS-3. OEMs using Zecotek's LFS-3 will be given priority to progress to LFS-8 for higher image resolution.

A newly designed MAPT was introduced as a leading photo sensor contender in areas of time-of-flight optical photo detection. The MAPT technology allows at least 10 times shorter photo-response duration with 10 times as high photo-response signal in comparison to known analogues.

A breakthrough manufacturing process was announced that uses robotics for assembling LFS crystal arrays. The new process results in faster production of the crystal arrays with exceptional accuracy and uniformity.

#### Debt Settlement

On January 5, 2018, the Company announced that it has entered into agreements to settle an aggregate of \$2,958,019 of debt owed to certain creditors to the Company, including directors, employees and third-party consultants, in consideration for the issuance of common shares of the Company. The creditors have agreed to a payout discount of up to 40% of total debt and will be issued 5,752,653 common shares of the Company at a deemed price of \$0.32 per share. A total of \$1,033,880 of the debt is held by current insiders of the Company and includes management fees and director fees. Insiders will receive a total of 1,938,526 common shares on completion of the debt settlement. The disinterested directors of the Company have approved the debt settlements with the respective insiders and their associates and affiliates.



#### **Options**

On January 5, 2018, the Company announced it will grant 15,200,000 incentive stock options to directors, employees and consultants at an exercise price of \$0.36. The options will expire January 5, 2023 and will vest on the basis of 25% immediately, 25% 3 months after the date of grant, 25% 6 months after the date of grant, and the remaining 25% vesting 9 months following the date of grant.

#### **Financings**

On January 29, 2018, the Company completed the share subscription agreements for the financing announced on December 29, 2017. Under the agreements, the subscribers purchased 16,103,000 units of the Company at a price of \$0.30 per unit, for gross proceeds of \$4,830,900. Each unit consists of one common share and one share purchase warrant. Each whole warrant entitles the holder to acquire one common share at an exercise price of \$0.43 per share for a period of 24 months after the date of the private placement. Pursuant to the closing of the financing, the Company paid finder's fees and agents commission of \$98,997.99 and issued non-transferable finder's warrants to purchase 329,993 Common Shares at \$0.43 per share before January 30, 2020. All shares and warrants are subject to a four-month hold period expiring on May 30, 2018.

On August 14, 2017, the Company completed the share subscription agreements for the financing announced on July 18, 2017. Under the agreements, the subscribers purchased 4,188,350 units of the Company at a price of \$0.30 per unit, for gross proceeds of \$1,256,505. Each unit consists of one common share and one share purchase warrant. Each whole warrant entitles the holder to acquire one common share at an exercise price of \$0.43 per share for a period of 24 months after the date of the private placement. Pursuant to the closing of the financing, the Company paid finder's fees and agents commission of \$45,100.34 and issued non-transferable finder's warrants to purchase 150,333 Common Shares at \$0.43 per share before August 11, 2019. All shares and warrants are subject to a four-month hold period expiring on December 12, 2017.

On July 26, 2017, the Company completed the share subscription for the financing announced on July 18, 2017. Under the agreements, the subscribers purchased 3,995,000 units of the Company at a price of \$0.30 per unit, for gross proceeds of \$1,198,500. Each unit consists of one common share and one share purchase warrant. Each whole warrant entitles the holder to acquire one common share at an exercise price of \$0.43 per share for a period of 24 months after the date of the private placement. Pursuant to the closing of the financing, the Company paid finder's fees and agents commission of \$45,195 and issued 150,650 non-transferable finder's warrants. Each finder's warrant is exercisable into units at \$0.43 per unit for a 24 month period. All shares and warrants are subject to a four-month hold period expiring on November 27, 2017.

On April 27, 2017, the Company completed the share subscription for the financing announced on April 25, 2017. Under the agreements, the subscribers purchased 1,866,667 units of the Company at a price of \$0.30 per unit, for gross proceeds of \$560,000. Each whole warrant entitles the holder to acquire one common share at an exercise price of \$0.43 per share for a period of 24 months after the date of the private placement. Pursuant to the closing of the financing, the Company paid finder's fees and agents commission of \$33,950 and issued 113,167 non-transferable finder's warrants. Each finder's warrant is exercisable into units at \$0.43 per unit for a 24 month period. All shares and warrants are subject to a four-month hold period expiring on August 28, 2017.

On March 17, 2017, the Company completed the third tranche of share subscription agreements for the financing announced on November 7, 2016. Under the agreements, the subscribers purchased 1,255,000 units of the Company at a price of \$0.30 per unit, for gross proceeds of \$376,500. Each unit consists of one common share and one share purchase warrant. Each whole warrant entitles the holder to acquire one common share at an exercise price of \$0.43 per share for a period of 24 months after the date of the private placement. Pursuant to the closing of the financing, the Company paid finder's fees and agents commission of \$14,070 and issued 46,900



non-transferable finder's warrants. Each finder's warrant is exercisable into units at \$0.30 per unit for a 24 month period. Each unit consists of one common share and one half of a share purchase warrant. Each whole warrant is exercisable into one common share at \$0.43 per share before March 17, 2019. All shares and warrants are subject to a four-month hold period expiring on July 18, 2017.

On November 25, 2016, the Company completed the second tranche of share subscription agreements for the financing announced on November 7, 2016. Under the agreements, the subscribers purchased 3,620,000 units of the Company at a price of \$0.30 per unit, for gross proceeds of \$1,086,000. Each unit consists of one common share and one share purchase warrant. Each whole warrant entitles the holder to acquire one common share at an exercise price of \$0.43 per share for a period of 24 months after the date of the private placement. Pursuant to the closing of the financing, the Company paid finder's fees and agents commission of \$69,020 and issued 230,067 non-transferable finder's warrants. Each finder's warrant is exercisable into units at \$0.30 per unit for a 24 month period. Each unit consists of one common share and one half of a share purchase warrant. Each whole warrant is exercisable into one common share at \$0.43 per share before November 25, 2018. All shares and warrants are subject to a four-month hold period.

On November 18, 2016, the Company completed the first tranche of share subscription agreements for the financing announced on November 7, 2016. Under the agreements, the subscribers purchased 1,000,000 units of the Company at a price of \$0.30 per unit, for gross proceeds of \$300,000. Each unit consists of one common share and one share purchase warrant. Each whole warrant entitles the holder to acquire one common share at an exercise price of \$0.43 per share for a period of 24 months after the date of the private placement. Pursuant to the closing of the financing, the Company paid finder's fees and agents commission of \$21,000 and issued 70,000 non-transferable finder's warrants. Each finder's warrant is exercisable into units at \$0.30 per unit for a 24 month period. Each unit consists of one common share and one half of a share purchase warrant. Each whole warrant is exercisable into one common share at \$0.43 per share for a 24 month period. All shares and warrants are subject to a four-month hold period.

On August 26, 2016, the Company completed the share subscription agreements for the financing announced on August 12, 2016. Under the agreements, the subscribers purchased 2,761,935 units of the Company at a price of \$0.30 per unit, for gross proceeds of \$828,581. Each unit consists of one common share and one share purchase warrant. Each whole warrant entitles the holder to acquire one common share at an exercise price of \$0.43 per share for a period of 24 months after the date of the private placement. Pursuant to the closing of the financing, the Company paid finder's fees and agents commission of \$57,161 and issued non-transferable finder's warrants to purchase 190,535 Common Shares at \$0.30 per share before August 29, 2018. All shares and warrants are subject to a four-month hold period expiring on December 30, 2016.



#### **Selected Annual Information**

	Audited Year Ended July 31, 2017	Audited Year Ended July 31, 2016	Audited Year Ended July 31, 2015
Revenue	\$ 466,874	\$ 1,487,516	\$ 451,747
Net loss for the year	\$ (3,420,911)	\$ (5,242,204)	\$ (7,165,016)
Net loss per share	\$ (0.03)	\$ (0.04)	\$ (0.07)
Total assets	\$ 1,054,372	\$ 803,552	\$ 1,290,288
Total long-term liabilities	Nil	Nil	Nil
Cash dividends declared	Nil	Nil	Nil

# **Results of Operations**

#### Net Loss

The Company recorded a net loss of \$733,650 or \$0.01 per share in the second quarter of fiscal 2018, compared with a net income of \$103,417 or \$nil per share in the same period of 2017, an increase of 809%. A net loss of \$1,219,340 or \$0.01 per share was recorded during the first six months of fiscal year 2018 compared to \$1,070,318 or \$0.02 per share in the same period of 2017 resulting in an increase of 14%. The operational losses resulted from general and administrative costs such as salaries, consulting fees, travel, rents, various overheads, marketing, engineering development and manufacturing contracts with BOET (Beijing Opto-Electronics Technology Co., Ltd., China, for the production of the Lutetium Fine Silicate (LFS) scintillation crystals.

#### Revenue

The Company recorded \$8,257 revenue in the second quarter of 2018 compared to \$6,029 in the same period in 2017, an increase of 37%. For the first six months of fiscal year 2018, revenues decreased by 8% to \$197,572 from \$213,675 in the same period of 2017. Revenues are from the sales of LFS scintillation crystals (imaging division) to PET OEMs and scientific organizations that are testing and using our products. Due to specific customer requirements the timing of sales and revenues can fluctuate significantly. The Company has firm commitments for future delivery of crystals.

As at January 31, 2018, US\$1.25 million of the US \$2.5 Million order for LFS scintillation crystals had not yet been fulfilled. Hamamatsu made the original order after reaching out to major end users of scintillation crystals, with whom it has had long term supply relationships for its detectors and other imaging components. The main users of scintillation crystals are PET scanning device original equipment manufacturers (OEM), and high energy physics centers such as CERN. Due to engineering design upgrades and internal integration processes at the OEMs the orders for the scintillation crystals have been delayed. Zecotek and Hamamatsu are working closely with the OEMs, and their scientific teams to expedite the integration process. Zecotek has started delivering preliminary amounts of scintillation crystals to Hamamatsu which are being used in various end user's new designs.



#### Operating, General and Administrative Expenses

Operating, General and administrative ("G&A") expenses amounted to \$1,726,524 in the second quarter of 2018, compared with \$1,023,001 in the same period of 2017, representing an increase in costs of 69%. For the first six months of fiscal year 2018, the G&A expenses amounted to \$2,612,683 as compared to \$1,885,192 for the same period in 2017, representing an increase of 39%.

Increases or decreases in specific categories for the first quarter of 2018 are:

- 1. Consulting and other professional fees; amounted to \$1,586,574 in the second quarter of 2018, compared with \$546,846 in the same period of 2017, representing an increase of 190%. For the first six months of fiscal year 2017, the expenses increased 148% from \$861,153 to \$2,134,925 primarily due to the increase in the advisory and consultancy fees.
- 2. Salaries and benefits; amounted to \$68,375 in the second quarter of 2018, compared with \$230,247 in the second quarter of 2017, representing a decrease of 70%. For the first six months of fiscal year 2018, expenses decreased 53% from \$473,376 to \$221,227 due to decrease in staff.
- 3. Travel amounted to \$51,903 in the second quarter of 2018, compared with \$62,228 in the same period of 2017, representing a decrease of 17%. For the first six months of fiscal year 2018, travel increased 51% from \$100,783 to \$152,349 due to more traveling during the period.
- 4. Rent amounted to \$40,474 in the second quarter of 2018, compared with \$32,142 in the second quarter of 2017, representing an increase of 26%. For the first six months of fiscal year 2018, expenses increased 11% from \$64,915 to \$72,300 due to increase in rent.

#### Research and Development Expenses

Research and development ("R&D") expenses amounted to \$144,059 in the second quarter of 2017, compared with \$313,318 in the second quarter of 2018 representing a decrease in costs by 54%. For the first six months of fiscal year 2018, the R&D expenses decreased 63% from \$655,019 to \$242,899 in the same period of 2017. The focus of the research and development projects that are still being currently carried out are to meet the specifications required by the OEM and adapting and improving our technologies for different applications demanded by the market.

#### Amortization of property and equipment

Amortization expense for the second quarter of 2018 decreased to \$3,458 from \$4,560 in the same period of 2017, a decrease of 24%. For the first six months of fiscal year 2018, the amortization expense amounted to \$8,209; as compared to \$9,244in the same period of 2017 reflecting a decrease of 11%. The variances are due to the accelerated depreciation methods used by the Company and change in foreign exchange rates.

# Amortization of patent costs

Amortization expense for the second quarter of 2018 decreased to \$3,144 from \$6,901 in the same period of 2017 representing a decrease of 54%. For the first six months of fiscal year 2018, the amortization expense amounted to \$9,944 as compared to \$13,997 representing a decrease of 29% in the same period of 2017. There is not much change in the amount of patent costs as all the current costs incurred are being expensed.

#### Trade and other payables

Trade and other payables consists of trade payables and accrued liabilities, wages payable, compensation waivers and government grants.



	January 31, 2018	January 31, 2017
Trade payables and accrued liabilities	\$ 1,373,390	\$ 2,993,502
Wages payable	1,294,155	782,989
Compensation waivers	976,777	976,777
Total	\$ 3,644,322	\$ 4,573,268

#### Related party transactions:

The Company undertook the following transactions with related parties. These transactions were measured at the exchange amounts which are the amounts of consideration established and agreed upon by the related parties.

- (a) The Company incurred \$16,722 (2017 \$17,844) in legal fees to Boughton Law Corporation, legal counsel to the Company, for legal services rendered during the quarter. A director of the Company is an Associate Counsel of Boughton Law Corporation. At January 31, 2018, \$41,259 (2017 \$59,778) was outstanding and included in trade and other payables.
- (b) The Company incurred fees of \$45,000 (2018 \$45,000) during the quarter for consulting services provided by the chief financial officer. At January 31, 2018, \$66,818 (2017, \$35,608) of the fees was unpaid and included in trade and other payables.
- (c) During the quarter, the Company incurred salaries of \$nil (2017 \$51,887) for the Executive Vice President, Operations. At January 31, 2018, \$134,811 (2017, \$113,089) of the salaries was unpaid and included in trade and other payables. The loan payable to the Executive Vice President, Operations amounted to \$nil as at January 31, 2018 (2017 \$45,548).
- (d) During the quarter, the Company incurred salaries and benefits of \$16,958 (2017 \$51,015) for the President and Chief Executive Officer ("CEO") and fees of \$118,703 (2017 \$119,035) for consulting services to a company controlled by the President and CEO. At January 31, 2018, \$76,057 (2018-\$83,244) of the salaries and benefits; and \$190,748 (2018 \$367,524) of the fees were unpaid and included in trade and other payables.
- (e) The Company incurred fees of \$17,500 (2017 \$19,500) during the quarter for directors' services. At January 31, 2017, \$219,670 (2017, \$189,000) was unpaid and included in trade and other payables.
- (f) The Company incurred fees of \$39,000 (2017 \$30,000) during the quarter for accounting and related services provided by the Corporate Secretary. At January 31, 2018, \$13,000 (2018 \$10,500) was unpaid and included in trade and other payables.

# **Summary of Quarterly Results**

The following table is a summary of the unaudited consolidated operating results of the Company presented in accordance with IFRS for the last eight quarters. Certain of the comparative figures in the following table have been reclassified to conform to the presentation adopted for 2017.

Revenues are from the sales of LFS scintillation crystals (imaging division) to PET OEMs and scientific organizations that are testing and using our products. Due to specific customer requirements the timing of sales and revenues can fluctuate significantly.



The net income in the quarter ended January 31, 2017 is due to the reversal of the liability of \$1,431,018 due to the Government of Singapore - Economic Development Board ("EDB") grant which was received in 2009 and was recognized as a liability, in trade and other payables, as at July 31, 2015 and 2016. EDB completed reviewing the information provided by the Company and agreed to waive the recovery of the grants in the 2017 fiscal year.

Quarters ended (unaudited)	January 31 2018	October 31 2017	July 31 2017	April 30 2017
Revenue Net loss	\$8,257	\$189,315	\$41,562	\$211,637
	\$733,650	\$485,690	\$1,241,859	\$1,108,734
Loss per share	\$0.01	\$0.00	\$0.01	\$0.01
Quarters ended	January 31	October 31 2016	July 31	April 30
(unaudited)	2017		2016	2016
Revenue Net loss	\$6,029	\$207,646	\$362,674	\$277,888
	\$(103,417)	\$1,173,735	\$1,362,446	\$837,541
Loss per share	\$0.00	\$0.01	\$0.01	\$0.01

# **Liquidity and Capital Resources**

At January 31, 2018 the Company had \$3,106,021 in cash and cash equivalents, compared to 419,676 as at January 31, 2017. The consolidated working capital deficiency was \$1,923,344 at January 31, 2018 compared to \$6,226,766 as at January 31, 2017.

For the six months ended January 31, 2018, the Company had a net loss of \$1,219,340 and negative cash flow from operating activities of \$3,067,061 compared to a net loss of \$1,070,318 and negative cash flow from operating activities of \$2,204,566 for the same period in fiscal year 2017. As a result of recurring losses over the Company's history, the Company has accumulated deficit of \$85,808,274 as at January 31, 2018. The accounts payable and accrued liabilities have decreased to \$3,644,322 as of January 31, 2018 compared to \$4,753,268 as of January 31, 2017.

Net cash used by investing activities in the six months ended January 31, 2018 was \$ 21,449 as compared to cash flow generated from investing activities of \$29,713 in the same period of fiscal 2017. The investment activities include disposal of equipment and repayment of loan.

Net cash provided by financing activities for the six months ended January 31, 2018, was \$5,667,877 compared to \$2,019,882 for the same period of fiscal 2017. The financing activities consisted of shares subscription received through private placements.



The Company has suffered recurring losses from operations and currently revenues do not generate enough cash to sustain its operations. Its ability to conduct operations, including the commercialization of its technologies, development of new technologies and the acquisition of additional technologies is dependent on its ability to raise funds as needed.

The Company has disclosed in Note 1(b) to the financial statements that there was substantial doubt as to the ability to continue as a going concern.

Management of the Company believes that it will be successful in meeting its business objectives and raising additional funds through private placements and sales revenue.

# **Share Capital**

Set out below is the outstanding share data of the Company as April 2, 2018. For additional details, see Notes 6 and 15 of the interim consolidated financial statements for January 31, 2018.

At April 2, 2018	Number outstanding
Common shares	159,133,148
Stock options	5,835,000
Common share purchase warrants	58,616,167
Agent's warrants	1,972,361

Outstanding options represent a total of 5,835,000 common shares issuable. At April 2, 2018 5,835,000 of these options were exercisable and would provide proceeds of \$4,044,000 to the Company if all the vested options were exercised in full. The exercise of these options is completely at the discretion of the holders and the Company has no indication that any of these options will be exercised.

At April 2, 2018 the Company had outstanding 58,616,167 common shares purchase warrants of which 2,432,673 are exercisable at \$0.53 per share expiring on November 5, 2018; 3,084,000 are exercisable at \$0.53 per share expiring on December 15, 2019; 3,828,570 are exercisable at \$0.50 per share expiring on November 6, 2018; 4,228,570 are exercisable at \$0.50 per share expiring on November 12, 2018; 5,003,073 are exercisable at \$0.50 per share expiring on November 28, 2018; 2,259,997 are exercisable at \$0.43 per share expiring on May 26, 2018; 2,989,333 are exercisable at \$0.43 per share expiring on June 20, 2018; 2,761,935 are exercisable at \$0.43 per share expiring on August 29, 2018; 1,000,000 are exercisable at \$0.43 per share expiring on November 18, 2018; 3,620,000 are exercisable at \$0.43 per share expiring on November 25, 2018; and 1,255,000 are exercisable at \$0.43 per share expiring on March 17, 2019; 1,866,667 are exercisable at \$0.43 per share expiring on April 27, 2019; 3,995,000 are exercisable at \$0.43 per share expiring on July 26, 2019; 4,188,350 are exercisable at \$0.43 per share expiring on August 14, 2019; and 16,102,999 are exercisable at \$0.43 per share expiring on January 29, 2020.

At April 2, 2018 the Company had outstanding 1,972,361 agent's or finder's warrants of which 79,100 are exercisable at \$0.43 per share expiring on May 26, 2018; 101,127 are exercisable at \$0.43 per share expiring on June 20, 2018; 35,000 are exercisable at \$0.43 per share expiring on November 18, 2018;115,033 are exercisable at \$0.43 per share expiring on November 25, 2018; 46,900 are exercisable at \$0.43 per share expiring on March



17, 2019; 150,650 are exercisable at \$0.43 per share expiring on July 26, 2019; 150,335 are exercisable at \$0.43 per share expiring on August 14, 2019; 329,993 are exercisable at \$0.43 per share expiring on January 29, 2020; 158,200 are exercisable at \$0.30 per share expiring on May 26, 2018; 202,253 are exercisable at \$0.30, per share expiring on June 20, 2018; 190,535 are exercisable at \$0.30 per share expiring on August 29, 2018; 70,000 are exercisable at \$0.30 per share expiring on November 18, 2018; 230,067 are exercisable at \$0.30 per share expiring on November 25, 2018; and 113,167 are exercisable at \$0.30 per share expiring on April 27, 2019.

# **Subsequent Event**

47,724 Finder warrants and 1,301,889 shareholders warrants expired on February 4, 2018.

#### **Financial Instruments**

#### (a) Credit risk:

Financial instruments that potentially subject the Company to concentration of credit risks include cash and restricted short term investments. The Company places its cash and restricted short term investments with high credit quality financial institutions. Short term investments are generally held in fixed rate securities. Concentration of credit risks with respect to receivables is limited.

#### (b) Foreign exchange risk:

Foreign exchange risk is the risk that the fair value or future cash flow of a financial instrument will fluctuate because of changes in foreign exchange rate. The Company has significant operations in Singapore, which gives rise to significant foreign currency translation risks from fluctuations and volatility of foreign exchange rate between the Canadian dollar and the Singapore dollar (SGD). A significant change in the currency exchange rates between the SGD relative to the Canadian dollar could have an effect on the Company's financial performance, financial position and cash flows. The Company does not use derivative instruments to reduce its exposure to exchange rate risk.

#### (c) Interest rate risk:

Interest rate risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates. Short-term investments with fixed interest rates include guaranteed investment certificates with original maturities of greater than three months, exposing the Company to interest rate risk. The Company does not use financial instruments to mitigate this interest rate risk.

#### (d) Liquidity risk:

Liquidity risk is the risk that the Company will not be able to meet its financial obligations as they become due. The Company currently settles its financial obligations using cash and cash equivalents. The Company manages its liquidity risk by forecasting cash flows from operations and anticipating any investing and financing activities. Trade and other payables and Loans payable have contractual maturity of 6 months or less.

# **Contractual Obligations**

The following table summarizes the Company's contractual obligations as at January 31, 2018, and the effect such obligations are expected to have on our liquidity and cash flows in future years. The table excludes amounts already recorded in the consolidated balance sheet as current liabilities and certain other purchase obligations:



	2018	2019	2020
Rental leases	\$ 20,384	\$ -	\$ -
Research Contracts	\$ 41,000	\$ 41,000	\$ 41,000

Purchase orders for fourth party components, finished goods and other goods and services are not included in the above table. Management is not able to determine the aggregate amount of such purchase orders that represent contractual obligations, as purchase orders may represent authorizations to purchase rather than binding agreements. For the purpose of this table, contractual obligations for purchase of goods or services are defined as agreements that are enforceable and legally binding on the Company and that specify all significant terms, including: fixed or minimum quantities to be purchased; fixed, minimum or variable price provisions; and the approximate timing of the transaction.

The Company has entered into contracts for other outsourced services. However, the obligations under these contracts are not significant and the contracts generally contain clauses allowing for cancellation without significant penalty. The expected timing of payment of the obligations discussed above is estimated based on current information. The timing of payments and actual amounts paid may be different depending on the time of receipt of goods or services, or for some obligations, changes to agreed-upon amounts.

# **Changes in Accounting Policies**

Refer to the Company's audited annual consolidated financial statements for the year ended July 31, 2017, note 3 for recently adopted and future accounting pronouncements.

#### **Audit Committee**

In compliance with the TSX Venture Exchange Policy 3.1 "Directors, Officers and Corporate Governance" section 10.1, the Audit Committee is comprised of three members, David Toyoda (independent), Canada; Dr. Mr. Erich Sager (independent), Switzerland and Dr. A.F Zerrouk (CEO). Mr. Toyoda is the Chairman of the Audit Committee.

David Toyoda is a lawyer with a Bachelor of Commerce degree with honors and serves on several Boards as Director. Dr. A.F. Zerrouk has many years' experience serving on the board of high tech organizations, he is a technology developer and scientific entrepreneur and founder of various technology companies. Mr. Erich Sager has held the position of Founding Partner and Chairman of Holding TwentyOne AG, a Swiss-based consulting firm since 2009. He has held several senior banking appointments in Switzerland, including Senior Vice-President, Private Banking, for Dresdner Bank (Switzerland) and Vice-President, Head of German Desk for Deutsche Bank (Switzerland) Ltd.

The Audit Committee will serve until the next Annual General Meeting at which time the new Board of Directors will appoint or re-appoint the Audit Committee.

#### **Additional Information**

Additional information relating to the Company, including its audited year-end financial statements is available on SEDAR at www.sedar.com.