

Company

Lightsense Technology, Inc.
 Terje Skotheim, CEO/Founder
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Industry

Scientific Devices, Public Health,
 Medical Diagnostics

Number of Employees: 10

Bank: Wells Fargo

Auditor: CliftonLarsonAllen

Law Firm: Hecker Pew LLC

Financing Sought: \$2M - \$4M equity

Current Investors:

Private investors, venture fund

Use of Funds:

Product development, R&D,
 marketing/sales

Team

Terje Skotheim, PhD, Founder/CEO
 Bruce Berkoff, CMO
 Joshua Nelson, CFO
 Wade Poteet, PhD, VP Technology
 John Coates, PhD, Optical Design
 Michael Berman, VP MEMS/Mfg.
 Kevin Harris, Dir Electronics Engineering
 Gordon Davidson, Gov't Business

Lightsense Technology, Inc.

Scientific Devices and Equipment, Tucson, AZ, USA

Designing and manufacturing innovative miniaturized spectrometers based on proprietary technology that uses AI data analytics.

Company Summary

Lightsense has developed a path-breaking technology platform for miniaturized spectrometers making it a leader in handheld, lightweight, inexpensive and highly sensitive spectroscopy devices that analyze materials and molecules using light from the ultraviolet to the infrared, producing a detailed analysis ("optical fingerprint") of the composition of the object of interest. The miniature spectrometers can address critical analytical and detection problems in a wide range of vertical markets. Lightsense focuses on public health issues such as detection of illicit drugs and viral and bacterial pathogens.

Executive Summary

Management

Terje Skotheim, PhD, world renowned scientist in physics and materials science, 20 years in successful academic career, multiple startups, holds over 70 patents.
 Bruce Berkoff, 20+ years technology/product/marketing exec. experience, formerly CMO of LG Display, AMAT/AKT, CBRITE, has raised \$3B+ & IPO.

Customer Problem

More accurate, convenient and efficient tools for detection of illicit drugs are needed by law enforcement, postal services, border control and building inspectors, in particular testing for methamphetamine, cocaine, heroin and fentanyl. Competing tools are five times more expensive than Lightsense devices while being less accurate and harder to use—especially inaccurate detecting trace amounts and adulterated substances common in drug smuggling. For detection of viral and bacterial pathogens (e.g., Coronavirus, Salmonella) there is a critical need for handheld tools that can provide real-time, in-the-field results. Current technology is either slow (hours to days for PCR) and expensive or uses blood samples (antibody), requiring clinical settings. The Lightsense technology platform can provide solutions for both problems.

Product/Services

The first product is the battery powered DrugDetect-M1 methamphetamine detector [see figure], a point-and-shoot instrument that reliably detects trace quantities of methamphetamine. This provides law enforcement and other authorities highly accurate test results in seconds, along with a time stamp and GPS coordinates. DrugDetect-M1 is a handheld, lightweight, small and easy-to-use device. It meets or exceeds state and national testing requirements. The second single-drug detector instrument to detect fentanyl will be launched in the second half of 2020. In 2021, Lightsense will launch the most advanced illicit drug detector, a multi-channel instrument that can detect all four major illicit drugs (fentanyl, methamphetamine, heroin, and cocaine). The DrugDetect series of instruments incorporate two independent spectroscopies for enhanced sensitivity and accuracy. This is a key building block for a radical new spectrometer architecture, a multi-spectral unit that integrates 3 separate spectroscopic processes with data fusion and artificial intelligence for pattern recognition and analysis, an *Enhanced Photoemission Spectrometer*, or *EPS*. This instrument is will be launched in 2022 and will have a wide range of applications in multiple verticals. The current Lightsense patent portfolio includes: three recently filed patent applications on spectrometer design, three issued patents on MEMS technology exclusively



DrugDetect-M1, first product based on Lightsense spectrometer platform. The dimensions are similar to that of a smartphone.



licensed, and four issued patents on UV/reflection spectrometers exclusively licensed. Multiple patent applications are in various stages of preparation.

Target Markets

Law enforcement: Lightsense plans to partner with smaller agencies at first and seek GSA partners and/or registration in parallel to enable faster sales growth. We will also work with relevant federal prime contractors as well as international partners that will share that data back to the U.S. Customers are expected in state and federal law enforcement and the US Postal Service.

Building inspection & remediation: This is a secondary market for methamphetamine detection only. The DrugDetect-M1 can detect residual methamphetamine from smoking on walls and furniture in houses, buildings, cars and RVs. Initial customers are expected to be remediation companies and car dealerships. We will establish distribution channels and build awareness with related organizations, such as The International Association of Certified Home Inspectors.

Future markets: Health care, especially hospitals for narcotics “diversion control” and QA/QC for Pharmaceuticals Rx, which is a huge economic problem in the US. Other future verticals include non-invasive medical diagnostics, fake drug discovery, environmental monitoring, and food safety and processing, etc. Several verticals will be addressed via both SaaS and IP licensing models. Another large future market for the integrated EPS architecture is detection of viral pathogens, e.g., coronavirus, with a handheld unit that provides real-time, on the spot instant information. This instrument can be used for screening at airports and other gathering places.

Lightsense is currently seeking federal funding to accelerate the development of the EPS architecture.

Business Model

Initial revenue will be generated from hardware sales of single-drug detectors, primarily methamphetamine detectors, followed quickly by fentanyl detectors. Hardware sales will be followed by SaaS sales in the hospital and Rx space (where multiple technology devices will be sold with embedded ML/AI connected to Lightsense Cloud databases. IP licensing will generate revenue from our science and technology base starting in the 3rd year.

Customer Success to Date

DrugDetect-M1 has been successfully tested by local (Arizona) and federal law enforcement (DEA, CBP) as well as a Mexican company in the international security market that covers all of Latin America. Early sales to these and related law enforcement partners are anticipated by Q2-2020. The low price of DrugDetect-M1 relative to the competition enables sales decisions at the local level.

Competitive Advantage

The foundational Lightsense technology is unique and protected by a growing patent portfolio, significant body of know-how and trade secrets. We have assembled a seasoned team and built an ecosystem of expertise on the highest level in advanced materials, microsystems (MEMS) design and fabrication, optical systems design, spectroscopy and AI software development. It includes partnerships with the optics technology powerhouses of the University of Arizona and the Leibniz Institute of Photonic Technology in Germany. This provides a significant barrier to entry for competitors. The only competing product to the Lightsense DrugDetect-M1 is the TruNarc handheld narcotics analyzer from Thermo Fisher. This is a Raman spectrometer, which can have difficulty distinguishing the signal generated by adulterated illicit drugs. Also, the TruNarc price is about \$20-25k, compared to about \$5k for DrugDetect-M1.

Funding to Support

The technology base has been under development by the principals of Lightsense for a decade and approximately \$700K has been invested to finance product development over the last three-year period. Lightsense is seeking \$2MM - \$4MM with an immediate tranche of \$300K - \$350K. This will fund the roll-out of the first generation DrugDetect platform (now complete) and develop the next two generations, as well as expand the product portfolio to include multi-drug devices, multi-technology spectrometers (EPS) and create our AI/ML data platform. The funds will be used to support the development of engineering prototypes into commercial products, develop the manufacturing supply chain and to build up our internal sales/marketing/product support efforts. Lightsense Technology. 6-year financial projections are summarized below.

In \$000's	2020	2021	2022	2023	2024	2024
Revenue	473	2,609	7,765	14,788	29,155	74,433
Expenditure (incl. COGS @ 20%)	877	2,523	4,425	7,752	14,062	30,592
Profit (Loss) = EBITDA	(404)	86	3,341	7,073	15,093	43,841