



bmseed
BioMedical
Sustainable Elastic Electronic Devices

BMSEED LLC
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COMPANY OVERVIEW

BMSEED's core mission is to provide innovative solutions to electrically and mechanically interface with cells, both inside and outside the body, with the ultimate goal to improve people's lives. Our core competency is the manufacturing of soft, compliant, and electromechanically robust interfaces with electrophysiologically active cells (neurons, muscles). Our objective is to initially become a leading supplier of neuroscience research tools, and later of implantable electrodes for clinical applications.

PRODUCT OVERVIEW

BMSEED sells equipment to researchers at universities and pharmaceutical companies to increase the efficiency of pre-clinical drug screening, and to reduce the high failure rate of clinical trials. Compared to the competition, BMSEED's products are more effective in pre-clinical research to predict clinical outcomes because the cells behave more comparably to the cells in the body, which allows to eliminate ineffective or toxic drugs earlier in the drug development process.

Using cell cultures during the pre-clinical phase of drug development has many advantages: (1) tight control of chemical and physical environment, (2) lower cost, (3) faster, and (4) fewer animals are needed. However, a substantial weakness of experiments with cell cultures is that the behavior of cultured cells often differs from the behavior of the corresponding cell type in an organism. This divergence limits the value of pre-clinical data to predict clinical outcomes, which contributes to the high failure rate of clinical trials. BMSEED is developing research equipment that addresses this weakness. The **Micro-Electrode Array Stretching Stimulating und Recording Equipment (MEASSuRE)** mimics the biophysical (mechanical, electrical) environment of cells in the body, so that cells in pre-clinical research behave comparably to cells in the body. This technology improves the efficiency and predictive value of pre-clinical drug screening, thus reducing the failure rate of clinical trials. The capability is enabled by the invention of BMSEED's proprietary stretchable microelectrodes. The competition is only able to mimic the bio-electric or bio-mechanical environment of cells in the body, but **NOT** both.

MARKET OPPORTUNITY

BMSEED's beach head is the neuroscience research market with a size of about \$200M. The initial focus is the R&D market for neurotrauma and neurodegenerative diseases because of the pressing societal need and the lack of suitable treatments. For example, despite 30 clinical trials and \$1.1B in development cost, there is no FDA approved drug to treat traumatic brain injury. Revenue from product sales for this application is \$140,000, mostly from the US Army Research Laboratory (ARL). The ARL and the biotechnology company Biogen have also ordered consumables for the MEASSuRE system at a price of \$500 per unit. In addition, MEASSuRE systems are currently being evaluated at Columbia University, Rutgers University, Georgia Institute of Technology, and Arizona State University.

For future growth, we initially target the Organ-on-a-Chip and pre-clinical drug screening market (\$7.4B). BMSEED's ultimate goal is to address applications that require FDA approval, such as the emerging market for personalized medicine and cell replacement therapies (\$4B), as well as implantable interfaces with the brain, spinal cord, and the peripheral nervous system for neuromodulation treatment (\$8B).

For the beach head neuroscience market, we will reach our customers through direct outbound marketing via inside sales and scientific conferences. We will also reach customers by inbound marketing through the website of our distributor ALA Scientific Instruments and through publications by our customers in scientific journals. We are also working with Harvard Bioscience on a distribution agreement. ALA Scientific Instruments and Harvard Bioscience are valuable partners because they address the needs of the neuroscience research market since decades. For the Organ-on-Chip applications, we plan to seek a partnership with a large distributor such as Thermo Fisher or Danaher. For the clinical applications, our strategy is to work with large medical device companies and integrate our electrodes with existing hardware for neural interfaces with the brain, spinal cord, and peripheral nerves.

TEAM

Oliver Graudejus, PhD, the Founder of BMSEED, is a chemist and has previously worked as key account technologist in business development in the semiconductor industry. He developed the core technology of BMSEED at Princeton University. He is in charge of sales, marketing, and finances. Ruben Ponce Wong, PhD, the Director of Technology, is a biomedical engineer with experience in manufacturing soft materials. He is working for BMSEED since 2015 and was critical for the development of the MEASSuRE system. He is in charge of technology development. BMSEED is supported by advisers at the Center for Entrepreneurial Innovation. BMSEED is also part of the current cohort of the NIH Commercialization Accelerator Program with Sunil Maulik, venture partner in FundRx, as Principal Advisor.