



# Enabling Innovative Neurophysiology

## Blackrock Microsystems (Blackrock)

is recognized as a leading worldwide provider of advanced hardware and software tools that help neuroscientists, engineers, and clinicians perform cutting-edge research in areas such as fundamental neuroscience, brain-machine interfaces, and neuro-prosthetics.

Headquartered in Salt Lake City, Utah, Blackrock offers turn-key solutions that facilitate the study and utilization of electrical signals acquired from the brain and peripheral nervous system. In addition, the Blackrock team and its academic collaborators are actively involved in extensive contract research focusing on acutely and chronically implantable microsystems and sensors (pressure, pH, pCO<sub>2</sub>, glucose) that will enable next-generation neuro- and other bio-/medical technologies.

## History

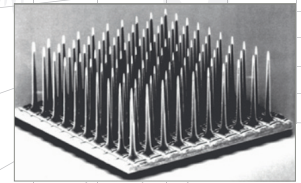
Blackrock was founded by Professor Florian Solzbacher, Director of the Microsystems Laboratory at the University of Utah, to better align ongoing R&D efforts in implantable micro sensors and associated signal processing with the specific needs of researchers and accelerate the development of technologies that promise immediate benefit to the neuroscience and neuro-engineering communities. Some of Blackrock's core technologies were initially commercialized in 1996 by a University of Utah spin-out company (Bionic Technologies) which was acquired by Cyberkinetics Neurotechnology Systems (CKI) in 2002. In 2008, Blackrock acquired all assets of CKI's Research Products Business and obtained exclusive rights to manufacture and market their FDA- cleared system for recording and analyzing human brain electrical activity.

## Products

Blackrock's products are innovative, highly-configurable neural data acquisition and analysis systems that can meet the design requirements of even the most challenging neurophysiology experiments. System configurations support both in vivo recordings from anesthetized and awake-behaving subjects (birds, mice, rats, cats, primates) and in vitro recordings from cultured microelectrode plates and brain-slice chambers.

We are committed to new product development and always looking for need-filling technologies to bring to market including, among other things, implantable chemical and pressure sensors, wireless telemetry, electrical stimulation, and advanced signal processing technologies.

## Microelectrode Arrays



Our microelectrode arrays have become the standard for multichannel, high-density neural recordings from large populations of neurons. Over the past two decades, this patented microelectrode array technology has undergone numerous refinements and repeated validations in a variety of species and preparations. This effort delivered a proven and well-documented method to obtain stable, long-term neural recordings of action potentials (spikes) and field potentials in brain and peripheral-nerve tissue. Because the array can be wired to various connector types, researchers can choose a connector that is optimal for chronic (long term) or acute (short term) recordings from small to large subjects as well as slice and cell-culture preparations.

## Array Inserter



The pneumatically-actuated inserter is used to precisely position microelectrode arrays in neural tissue at pre-defined depths. Its high-speed, vibration-free operation ensures minimal tissue insult which is critical for stable and high-quality neural signal recordings.

## Cerebus™



The Cerebus™ is a sophisticated multi-channel system for recording and analysis of animal brain and peripheral-nerve electrical activity from up to 256 electrodes.

It is compatible with individual stiff-wire electrodes, micro-electrode and microwire arrays, planar silicon probes, subdural ECoG grids, and epidural and scalp EEG electrodes. The Cerebus™ hardware captures and processes action potential (spikes) and field potentials, as well as behavior, stimulus and other experimental events – in real time. The Cerebus™ software provides a user-friendly interface to configure the signal processing and visualize the processed data as it is being acquired.

The system's powerful and flexible digital architecture allows the user to perform a variety of online functions simultaneously from digital filtering and adaptive spike sorting to data streaming and storage.

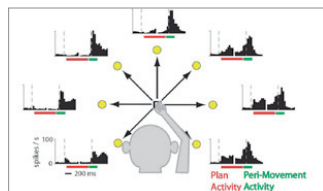
## NeuroPort™



The NeuroPort™ is an FDA-cleared medical device intended for temporary (< 30 days) recording and analysis of human brain electrical activity from 96 neural micro-electrodes. It consists of two parts: the NeuroPort™ Microelectrode Array and the NeuroPort™ Neural Signal Processor. The NeuroPort™ Micro-electrode Array senses spikes and field potentials in the brain. The NeuroPort™ NSP records these high-resolution signals along with other experimental data and provides a clinician with the tools to analyze them.

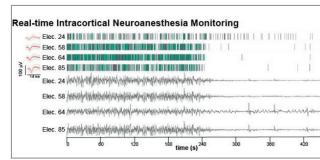
## Example Customer Applications

Dr. Krishna Shenoy at Stanford U (monkeys)



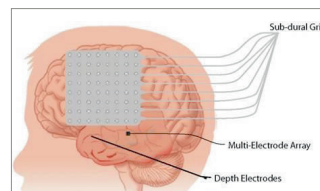
How do neurons in cerebral cortex plan and guide reaching arm movements?

Dr. Anthony Hudetz at Medical College of Wisconsin (rats)



What is the brain's response to anesthesia in terms of its network dynamics?

Drs. Bradley Greger and Paul House at the U of Utah (humans)



How can recording and stimulation of neurons be used to treat human pathological states such as paralysis and epilepsy?

## Training

### Surgical Workshops



Blackrock is pleased to offer hands-on surgical training workshops in the United States (Chicago, IL and Providence, RI) and China (Beijing, Shanghai). Participants attend a lecture covering the basic surgical procedure before performing an actual array implantation – all led by an experienced animal surgeon.

## Onsite Installation and Instruction

A critical component of all Cerebus™ or NeuroPort™ purchases is the accompanying setup and testing in your laboratory by a technical Blackrock representative. You can rely on our expertise in electrophysiology, noise troubleshooting, and interfacing to 3rd party equipment to have you ready to run your experiments by the time we leave.

## Service/Support

The moment we leave your laboratory, we are available 24 hours a day, seven days a week to quickly resolve and professionally respond to any service or support issues that may arise. If a technical issue is not immediately solvable remotely, shortly thereafter a Blackrock representative arrives in your lab for onsite resolution. Because we are not successful unless you are, we do whatever it takes to maximize your productivity and minimize your downtime.

## Sales

Blackrock not only offers superior products and services, but also highly-trained personnel who are dedicated to identifying ways to that meet your experimental design requirements. We welcome you to contact our technical sales team (Tel: 801 582-5533, Email: sales@blackrockmicro.com) to learn more about many solutions we have to help you reach your neurophysiology research goals.