PURDUE INNOVATES | Office of Technology Commercialization

CMOS SOI Micro-Electrode Arrays for Biological Sensing and Actuation

A highly-flexible microelectrode array built on a complementary metal-oxide semiconductor chip offers improved yield and sensitivity for sensing live cells and tissues, along with wireless integration capabilities.

Microelectrode arrays (MEAs) are devices that serve as neural interfaces, connecting neural signals to electronic circuitry. Current MEAs are not fabricated in a complementary metal-oxide semiconductor (CMOS) platform; therefore, they suffer from low yield and low sensitivity and require packaging to bring the lead out. The CMOS version of MEA is not flexible and still requires packaging.

Researchers at Purdue University have developed a highly-flexible microelectrode array built on a complementary metal oxide semiconductor chip that senses live cells, neurons, and live tissues. This technology not only improves the yield and sensitivity, it brings the advantages of CMOS integration, e.g., wireless link and wireless powering. It can be used on concave and pulsating and moving tissues and cells, such as a retina. The technology will make it possible to achieve a single-cell characterization platform, cochlea implant, wireless retina, neural recording devices, and nerve connectors to mend severed peripheral nerves.

Advantages:

-Highly flexible

-Low noise and high fidelity

-Wireless link and wireless powering

Potential Applications:

-Cochlea implants

-Wireless neural prosthetic such as retina implant or wireless neural recording devices

Technology ID
2016-MOHA-67340

Category
Semiconductors/Devices & Components
Materials Science & Nanotechnology/Biomedical & Bioinspired Materials

Authors
Saeed Mohammadi
Hossein Pajouhi
Mojgan Sarmadi

Further information
Matt Halladay
MRHalladay@prf.org

Erinn Frank
EEFrank@prf.org

View online

TRL: 4

Intellectual Property:

Provisional-Patent, 2016-11-16, United States

Utility Patent, 2017-11-16, United States

DIV-Patent, 2023-04-14, United States

Keywords: Microelectrode arrays (MEAs), neural interfaces, complementary metal-oxide semiconductor (CMOS), highly-flexible MEA, CMOS integration, wireless neural prosthetic, retina implant, cochlea implant, neural recording devices, severed peripheral nerves, single-cell characterization platform, Biomarkers, Biotechnology, Electrical Engineering, Implants, Microfabrication