

Special Issue

Neural Microelectrodes: Design, Integration, and Applications

Message from the Guest Editors

Microelectrode arrays serve as critical interfaces between biological systems and electronic devices, enabling the recording and stimulation of neural activity with high spatial and temporal precision. Over the past decades, they have played a foundational role in neuroscience research, neuroprosthetics, and brain-machine interfaces. With recent advances in materials science, microfabrication, and circuit integration, the next generation of microelectrode arrays offers unprecedented capabilities—including higher channel counts, improved biocompatibility, and enhanced mechanical flexibility. These innovations are driving a shift from basic research tools toward clinically and commercially viable technologies, opening new possibilities in both understanding and modulating complex neural systems. This Special Issue aims to highlight recent advances in the application of next-generation microelectrode arrays for neural interfacing. As microelectrode technologies continue to evolve in terms of resolution, flexibility, biocompatibility, and scalability, their role in both fundamental neuroscience and translational neurotechnology is rapidly expanding.

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