DEVELOPMENT OF IMPLANTABLE MICROELECTRODE ARRAYS AT THE NEURAL ENGINEERING LAB (NEL) AT THE UNIVERSITY OF MICHIGAN

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Researchers in the Neural Engineering Laboratory (NEL) are working to develop and refine several types of microdevices to provide long-term, high-density, two-way communication channels to highly specific areas of the brain. This has recently resulted in a new class of thin-film polymer implantable microelectrodes for neural recording and electrical stimulation. These devices are notable for their flexibility and their surfaces that can be modified to receive specially engineered bioactive coatings. The NEL is also actively involved in the continued development of the class of silicon-based implantable microelectrode arrays that have been a hallmark of Michigan Biomedical Engineering and Electrical Engineering for many years (http://www.engin.umich.edu/center/cnct/). Several projects are working to extend these base MEMS technologies to include micro-drug delivery functionality. These neural implant technologies provide the means to create reliable neural interfaces that enable the investigation and development of sophisticated brain-machine interface systems. The NEL is conducting several experimental studies to investigate sensory augmentation, neural control, and neural plasticity, each within the context of neuroprosthetic systems and brain-machine interfaces. Electrically induced and naturally evoked stimulus discrimination behavior are being investigated in animals using paradigms that combine natural sound stimulation and cortical microstimulation. The NEL website provides more information on these projects (http://www.eecs.umich.edu/NELab).