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Implanted Flexible Neural Prostheses and MEMS

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Abstract

Implanted flexible neural interfaces and MEMS devices currently become popular because they are considered as the viable solution to realize implanted prostheses for novel applications such as human-machine interface and electroceuticals. For example, these flexible electrodes and sensors placed within the peripheral nervous system, the nerves that work throughout our arms and legs. Selective sciatic nerve recording and stimulation are investigated using flexible electrodes with minimal pressure on the nerve, but still provided a good electrical contact with the nerve. Selective muscle stimulation was achieved by two stimulation configurations via nerve electrode and muscle electrode. Other flexible devices, including physiological signal sensing, energy harvesting and nanomedicine delivery are also developed as novel approaches to further understand disease mechanisms and to explore electroceuticals. Secondly, various optogenetic devices are also demonstrated for sciatic nerve and brain. The technology advance in the implanted flexible biomedical devices will create tremendous applications related to the central nervous system, including the brain and spinal cord, and novel electroceuticals, etc.