

A Polyimide Based Split-Ring Neural Interface Electrode for Neural Signal Recording

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Abstract : We have developed a polyimide based neural interface electrode to record nerve signals from the sciatic nerve of a rat. The neural interface electrode has a split-ring shape, with four protruding gold electrodes for recording, and two reference gold electrodes around the split-ring. The split-ring electrode can be opened up to encircle the sciatic nerve. The four electrodes can be bent to sit on top of the nerve and hold the device in position, while the split-ring frame remains flat. In comparison, while traditional cuff electrodes can only fit certain sizes of the nerve, the developed device can fit a variety of rat sciatic nerve dimensions from 0.6 mm to 1.0 mm, and adapt to the chronic changes in the nerve as the electrode tips are bendable. The electrochemical impedance spectroscopy measurement was conducted. The gold electrode impedance is on the order of 10 k Ω , showing excellent charge injection capacity to record neural signals.

Keywords : impedance, neural interface, split-ring electrode, neural signal recording

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