A Biocompatible Ionogel-Based Neurointerface for Highly Stable Capacitive Charge Injection

김주성, 김준호[1], 임준우[2], 박준재,
김윤아, 정재현[2], 박성민[1], 김도환†
한양대학교; [1]포항공과대학교; [2]숭실대학교
(dhkim76@hanyang.ac.kr†)

Reducing the complications caused by neural prostheses in human tissues is necessary for preventing unintended immune responses. Recently, efforts to overcome this limitation have attracted a great deal of attention, and research into implantable neuro-stimulators using conducting polymers is surging. However, the faradaic charge injection in the conducting polymers, which results in the creation of chemical species, cause disorders of acidosis. Here, we report on a novel design for biocompatible ionogel based electrodes for neural stimulation using the capacitive charge injection mechanism. The biocompatible iontrode serves as a neural interface and an ion-diffusion barrier; they consist of choline-derived ionic liquids and the chitosan polymer matrix, and the graphene oxide membrane layer which is coated on the surface of the iontrode respectively. The ion diffusion barrier effectively prevents ion exchange in the neural interface and enables relatively high charge injection capacity owing to the large surface area of the graphene oxide. This allowed us to demonstrate biocompatible iontrode for highly stable electrical stimulation of the sciatic nerve in live mice.