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강연제목: 신경병성 통증 완화를 위한 생체흡수성 소재 및 기기

Implantable, Bioresorbable Materials and Electronics for Neuropathic Pain Relief

Abstract

Pharmacological approaches on pain management with opioids or over-the-counter medications have considered as the most common treatment options for neuropathic pain. A significant limitation of these schemes involves misuse, overprescription, and specifically severe addictions to them. Furthermore, this procedure takes as little as a few minutes and affects entirely to the unspecified area in addition to the onset site of pain. In response, local physical stimulation (e.g., electrical, thermal, ultrasound or light) applied to the targeted nerve offers a promising therapeutic alternative to pharmacological treatments for relief of neuropathic pain.

This work introduces safe and minimally invasive neural platforms, built with biocompatible/bioresorbable materials that enables electrical and/or thermal nerve block. These platforms are composed of bioresorbable metal as an electrode (e,g., Mo, Mg) and soft polymers as a neural cuff, designed to wrap around the nerve conformally and deliver stimuli directly to enhance the efficacy of pain relief. Electrochemical and morphological studies on contact electrodes compared with conventional electrodes (i.e., Pt) demonstrate comparable performance as a neural electrode; and integration of electronic elements, a micro-patterned heater and temperature sensor, ensures reliably heating and monitoring to the nerves during treatment. Engineered material designs support harmless dissolution of the entire platforms within the body after the desired period of use.

Brief Biosketch

Geumbee Lee obtained Ph.D. degree in Nano-Bio-Information-Technology from Korea University in 2019. She then spent 5 years on a postdoctoral research fellow in Querrey Simpson Institute for Bioelectronics at Northwestern University, most recently has joined as an Assistant Professor in the department of chemical engineering at Kyungpook National University. Her research interests involve the development of materials and fabrication strategies for functional energy storage devices in wearable electronics, as well as the advancement of transient bioelectronics based on eco/bioresorbable materials.