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강연제목: 조직 보철용 신축성 생체전자소재/ (Stretchable Bioelectronic Materials for Skin, Retinal, and Neural Prostheses)

Abstract: Soft wearable/implantable bioelectronic systems capable of monitoring electrophysiological signals evoked by external mechanical/optical/electrical stimuli and delivering the feedback information have been considered essential functional components in realizing the future closed-loop prostheses. Despite such significant progress, materials fatigue and the corresponding electrical malfunction issues still remain challenging due to the lack of optimal materials/fabrication/integration/system strategies that simultaneously meet tissue-device modulus matching, electrical/mechanical durability, biocompatibility, uniformity, reproducibility, and even strain-induced error correction.

Herein, we describe optimal materials design strategies and device fabrication/integration technologies for the three different kinds of intrinsically stretchable prosthetic bioelectronics. Using various stretchable conducting/semiconducting composites, we developed damage-durable prostheses consisting of mechanical/electrophysiological/optoelectronic sensors, non-volatile resistive random access memory, and quantum dot display modules for the shape-tunable prosthetic skin, retina, and even peripheral nerve. Further, to improve the sensing accuracy of soft bioelectronic devices, electrical malfunctions originating from either repetitive stretching-induced materials relaxation or fatigue were precisely corrected by using machine learning techniques, leading to realization of the high-performance strain-insensitive soft bioelectronics.

Brief Biosketch

서울대학교 화학생물공학부 박사 (2015)

스탠포드대학교 화학공학과 박사후과정 (2016)

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