이름: 송강일 / Kang-Il Song
직위: 조교수 / Assistant professor
소속: 부경대학교, 스마트헬스케어학부 /
Pukyong national university, Division of Smart healthcare
기타소속: 디지털헬스케어연구센터 / Digital healthcare research center

강연 제목: 신경 재활을 위한 유연전자 소자와 뇌/말초 신경계 네트워킹 / Flexible bioelectroncis and brain/pheripheral nerve networking for neurorehabilitation

Abstract:
Developing clinical-grade electronic medicine for neurological disorders is a challenging task due to the lack of rational material design that mimics the dynamic mechanical nature of the nervous system. Recent bioelectronic works have shown remarkable results by introducing soft and stretchable materials that allow conformal implantation on soft nerve tissues. In addition, soft adhesives have provided a strategy for long-term stable coupling to tissues and sustainable operation during dynamic movements on nerve tissues. Despite these efforts, achieving long-term stability of devices interfacing with the nervous system remains challenging due to material degradation caused by dynamic mechanical deformations in peripheral nerves. To address this challenge, we introduce a new type of soft bioelectronic platform that is both durable and fatigue-resistant, with multi-scale sustainable adhesion. By combining robust tissue adhesion with fatigue-resistant capability, we were able to successfully collect electrophysiological signals generated by various tissues, ranging from rodent sciatic nerve to muscle and brain. Notably, we collected neural signals from a live walking rat, which were analyzed by a deep neural network to accurately predict the joint position. Also, the demonstration of nerve-to-nerve interfacing prove its potential for using in electroceuticals. These results demonstrate that adhesion and fatigue-resistant soft bioelectronics can enable the collection and analysis of large-sized in vivo data, offering a promising avenue for addressing challenges in neurological disorders.

Brief Biosketch

[Research interest]

Intelligent healthcare system (지능형 헬스케어 시스템), Electroceuticals (전자약), Neural interface (신경인터페이스), flexible and stretchable bio electronics (유연전자소자), Neural engineering (신경공학).

[Biography]

He received the Ph.D in electric and electronics engineering from Yonsei university, Seoul, Korea in 2017. From 2017 to 2020, he was a researcher at the Korea institute of science and technology (KIST), Seoul, Korea. From 2020 to 2022, he was a senior researcher at the Daegu-Gyeongbuk Medical Innovation Foundation, Deagu, Korea. Currently, He is an Assistant professor at Pukyong national university, Busan, Korea.