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국문 강연제목: 뇌 인터페이싱 기기를 위한 면역 억제 기능성 초박막 하이드로젤 개발

영문 강연제목: Nonimmunogenic ultrathin hydrogels for neural interfacing devices

Abstract(영문):

Neural interfaces have evolved from rigid designs to flexible, multifunctional platforms enabling neuromodulation, delivery, and high-fidelity recording. However, the biological response at device-tissue interfaces remains the challenge for long-term neural recording, with inflammatory cascades causing neuronal damage and glial encapsulation. This presentation explores nanoscale surface engineering approaches, photoinitiated chemical vapor deposition (piCVD), as a versatile platform for tailored neural probe functionalization. This solvent-free technique enables conformal coating on complex geometries while preserving electrical properties of neural probes. We demonstrate ultrathin hydrogels that combine optimal hydrophilicity and mechanical compliance, creating biocompatible interfaces that mitigate foreign body responses. Comprehensive *in vivo* studies reveal that nanoscale-engineered surfaces enhance neural recording performance, with up to 2-fold improvements in signal-to-noise ratio and extending functional recording lifetimes to three months and beyond.

Brief Biosketch

Hyejeong Seong received her B.S. (2007) and Ph.D. (2016) degrees in Chemical and Biomolecular Engineering from KAIST. She worked as a Research Associate in Department of Materials at Imperial College London from 2017 to 2020. Currently, she is a Senior Researcher in the Brain Science Institute at KIST. Her accolades include a Marie Skłodowska-Curie Fellow from the European Union, and an NRF-Fellowship from Republic of Korea. Her research interests focus on microfabrication of biomaterials for cell interfacing applications and biosensors.