



Department of  
Biomedical Engineering

香港城市大學  
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# Ultra-soft bioelectronics for neural engineering

## Dr. Jung Min Lee

Date: 29 October 2024

Time: 10:00 am

Venue: YEUNG-B6605, 6/F

Yeung Kin Man Academic Building

### Abstract

The development of electrophysiological recording and stimulation technologies has yielded significant insights into the neurological underpinnings of behavior and cognition, and also has led to therapeutic devices. For example, implantable probes, such as Si-based or polymer-based multi-electrode arrays with high electrode densities have played a major role in improving the understanding of neuronal networks. However, to fully realize these benefits, stable tracking of neurons over widely separated areas of the brain is required to define neural circuits and networks that evolve over timescales ranging from milliseconds to years. In this talk, I will present the development of implantable ultra-flexible mesh electronics that has enabled stable long-term chronic detection of single-neuron activity recorded in the brain and retina. Key developments that will be discussed include, 1) a direct contact method input/output (I/O) connection methodology that allows for facile connection between the ultra-flexible electronics and recording instrumentation, 2) high-performance neural recording using double-sided three-dimensional (3D) recording electrodes that enable unbiased 3D sampling of the 3D interconnected tissue of the brain, and 3) multi-site "stitching" of single ultra-flexible probe in rodent brains for stable chronic single-neuron tracking over multiple brain regions via a single low-mass I/O interface. In addition, I will briefly talk about ongoing work focused on integration of mesh electronics and CMOS IC-chips for large-scale recording to allow for recording and stimulation with thousands of electrodes over multiple brain regions.

### Biography

Jung Min Lee earned their Ph.D. in Material Science and Engineering from Hanyang University in February 2015, where they also completed their M.S. and B.S. degrees.

Jung Min Lee has conducted postdoctoral research at prestigious institutions, including:

- Seoul National University (Physics & Astronomy) from September 2023 to February 2024.
- Korea University (Department of Physics) from March 2015 to August 2023.
- Harvard University (Department of Chemistry and Chemical Biology) from February 2017 to June 2020.