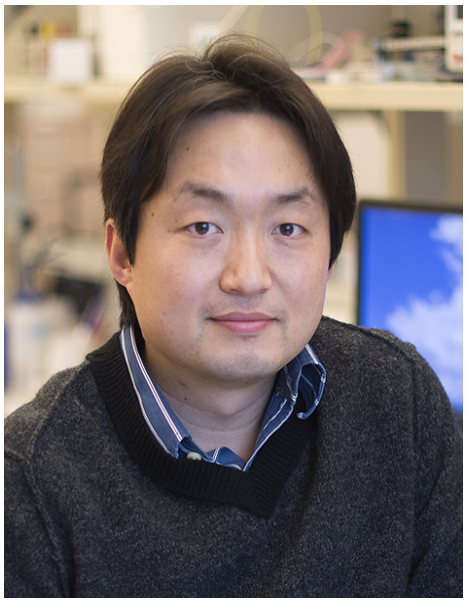
Materials Chemistry Seminar

Friday, February 23, 2024
11:30 a.m. ~ BRWN 4102

"Wearable Biomedical Devices for Human Healthcare"



Chi Hwan Lee, Ph.D.

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Abstract:

My laboratory at Purdue University focuses on bridging the critical gap between engineering and unmet clinical needs through the innovation of wearable technologies. Our scholarly efforts are dedicated to addressing this gap using novel yet simple flexible micro-transducers with a clear path towards translation into measurable clinical impacts. We explore a wide variety of wearable biomedical devices that are safely attachable to the skin or eye, enabling continuous remote assessment of human health and chronic diseases. The potential applications of these devices are far-reaching, from healthcare to rehabilitation and telemedicine. In this talk, I will discuss: (1) Sticktronics - sticker-like thin film electronics that are flexibly attachable to the curved surfaces of arbitrary places, increasing the range of industrial and healthcare applications; (2) sensory skin patches that are tailored for various clinical needs of particular urgency in the telemedicine field; (3) smart contact lenses that are built on various commercial brands of soft contact lenses, which could be used to continuously monitor chronic ocular diseases such as glaucoma; and (4) injectable silicon nanoneedles that are built on flexible, biodegradable patches for painless and long-term sustained ocular drug delivery. I will present the results of detailed experimental and theoretical studies to provide insights into each of these topics. At my seminar for the Westwood (President's house) Lecture Series on January 25th 2023, I discussed some of the key aspects of these topics for those who were present.

Referenced Articles:
https://doi.org/10.1038/s41467-022-33254-4
https://www.science.org/doi/10.1126/sciadv.adk4295

Dr. Chi Hwan Lee is the Lesli A. Geddes Associate Professor of Biomedical Engineering and Associate Professor of Mechanical Engineering, and by Courtesy, of Materials Engineering, and Speech, Language, and Hearing Sciences at Purdue University. He obtained dual B.S. degrees from Industrial Engineering at Ajou University and Mechanical Engineering at Illinois Institute of Technology. He obtained his M.S. and Ph.D. degrees in Mechanical Engineering from Stanford University in 2009 and 2013, respectively. Afterward, he completed a postdoctoral training in the Department of Materials Science and Engineering at the University of Illinois at Urbana-Champaign, under the guidance of Professor John A. Rogers. His research focuses on developing wearable devices to address unmet clinical needs and translate them into measurable clinical impacts. For his notable contributions, Dr. Lee has been honored with prestigious awards such as the 2021 Sensors Young Investigator Award, 2020 Purdue CoE Early Career Research Award, 2019 NIH Trailblazer Award, and 2019 Korean-American Scientists and Engineers Association (KSEA) Young Investigator Award. He has published over 70 journal papers and four book chapters, and issued 6 U.S. patents, filed 11 utility patents, and co-founded four startup companies.

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