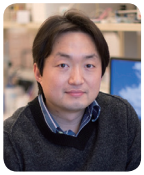
2022 AJOU MST International Mini-symposium

Healthcare research in ChemBio Medicine

날짜 2022.07.05.(Tue)

장소 on/off-line Hybrid(율곡관 영상회의실 151호)
Zoom 접속정보(우측 QR코드)
회의 ID 868 5850 0891
암호 2191591

프로그램

10:00~10:05	Welcome Message		Sangdun Choi, Ph.D. (Dean, Graduate School of Ajou University)
10:05~10:45	Sticker-Like Electronics (Sticktronics) for Wearable Healthcare		Chi Hwan Lee, Ph.D. (Leslie A. Greddes Associate Professor of Biomedical Engineering, Associate professor of Mechanical Engineering, and by courtesy, of material engineering and speech, language, and hearing science, Purdue University, USA)
10:45~11:25	BioMEMS-enabled novel implantable medical devices		Hyowon "Hugh" Lee, Ph.D. (Director of Center for Implantable Devices, Associate professor of Weldon School of Biomedical Engineering, Purdue University, USA)
11:25~12:05	Digital and material hybridizations for future mobile health (mHealth)		Young L. Kim, Ph.D., MSCI (University Faculty Scholar, Associate head for research and professor, Weldon School of Biomedical Engineering, Co-director of Interdisciplinary Biomedical Sciences Program, Purdue University)
12:05~12:10	Concluding Remark		Yong-Sung Kim, Ph.D. (Director, BK21four program of Chem-Bio Medicine Graduate School)

Sticker-Like Electronics (Sticktronics) for Wearable Healthcare

Chi Hwan Lee, PhD
Leslie A. Geddes Associate Professor of Biomedical Engineering, Mechanical Engineering, and by Courtesy of Materials Engineering and Speech, Language, & Hearing Sciences at Purdue University & Adjunct Professor of Optometry at Indiana University

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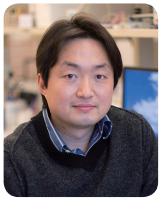

Abstract
My lab at Purdue University focuses on bridging a critical gap between engineering and unmet clinical needs through the innovation of wearable technologies. Our scholarly efforts are dedicated to addressing the gap using novel yet simple flexible micro-transducers with a clear path towards translation into measurable economic and societal impacts. We explore a variety type of wearable biomedical devices that are safely attachable to the skin or even eye, allowing for continuous remote assessment of human health and diseases. The pragmatic application of these devices is boundless ranging from healthcare to rehabilitation and to telemedicine. In this talk, I will introduce the following topics: (1) Sticker-like electronics (StickTronics) that are flexibly attachable to curvilinear surfaces of arbitrary places, enabling a variety of pragmatic applications in human healthcare; (2) Wearable biomedical devices that are tailored for the human skin to address clinical needs of particular urgent concerns in the field of telemedicine; (3) Smart contact lenses that are built on various commercial brands of soft contact lenses for continuous remote assessment of ocular health and chronic diseases; and (4) Injectable silicon nanoneedles that are built on flexible and biodegradable patches for painless and long-term sustained ocular drug delivery. In each topic, I will also discuss about the results of detailed experimental and theoretical studies to uncover the essential attributes of functional materials, system-level integrations, and clinical implementations.

BioMEMS-enabled novel implantable medical devices

Hyowon "Hugh" Lee
Director | Center for Implantable Devices | Associate Professor | Weldon School of Biomedical Engineering | Purdue University
Website https://engineering.purdue.edu/LIMR

Abstract
Development of chronically reliable and multifunctional implantable medical devices is an enormous challenge in biomedical engineering with significant economic and clinical implications. Soon after implantation, biosensors often suffer from substantial performance degradation and premature failures due to various abiotic and biotic failure modes. Enabling technologies that improve the lifetime of these implantable biosensors can have an enormous impact on many debilitating chronic neurodegenerative diseases that are difficult to diagnose and treat. In this presentation, I will discuss our latest efforts to utilize nano and microscale transducers to fabricate self-clearing implantable medical devices including sensors and actuators. We utilize both passive and active anti-biofouling approaches to improve the reliability and functionality of these implantable devices. As a proof-of-concept, I will share our efforts to create chronically implantable self-clearing catheters, electrochemical biosensor arrays, and high-performance neurostimulation interfaces.

Bio
Hyowon "Hugh" Lee received his M.S. and Ph.D. degrees in biomedical engineering from the University of California, Los Angeles, in 2008 and 2011, respectively. Before joining Purdue, he worked as a senior process engineer for St. Jude Medical's Implantable Electronic Systems Division where he worked on manufacturing challenges associated with implantable electronic devices such as pacemakers, implantable cardioverter defibrillators, deep brain stimulators, and spinal cord stimulators. At UCLA, he trained in the areas of neuroengineering and microfabrication under Jack Judy. His current research interest centers around improving the reliability and functionality of implantable sensors and actuators. He is a recipient of the NSF CAREER award and he recently co-founded Rescue Biomedical, LLC, which is a startup that focuses on developing a closed-loop solution for automatic naloxone delivery for opioid overdose. His lab is currently supported by NINDS, NHLBI, NSF, Indiana Clinical and Translational Science Institute, Samsung, and Eli Lilly.

Digital and material hybridizations for future mobile health (mHealth)

Young L. Kim, PhD, MSCI
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Abstract
His spectrum of work, on the surface, appears to be atypically broad, ranging from cancer research, biostatistics, optical imaging, spectroscopy, biomaterials, metamaterials, to cryptographic primitives. His research and engagement are connected and coherent such that data-centric approaches and fusion of physical and digital properties can avoid unnecessarily complex control or manipulation, which Professor Kim dubs 'advanced simplicity'. His recent research has focused on fusion of material and digital properties to develop mobile health solutions and healthcare security technologies.
In this talk, he will introduce his ongoing work on mobile health (mHealth) and dosage-level (on-dose) anticounterfeit technologies. i) His lab has provided examples of using the built-in sensors of smartphones for mHealth solutions. This data-centric approach could be revolutionary as demonstrated in his noninvasive mHealth assessments of blood hemoglobin levels from peripheral tissue. ii) The problem of counterfeit medicines is not new, but is becoming a tremendous burden to society. His lab has pioneered several cyberphysical biomedical security technologies for on-dose anticounterfeit measures and authentication features.