Skin-like Electronics and their Applications for Human-Machine Interfaces and Health Monitoring

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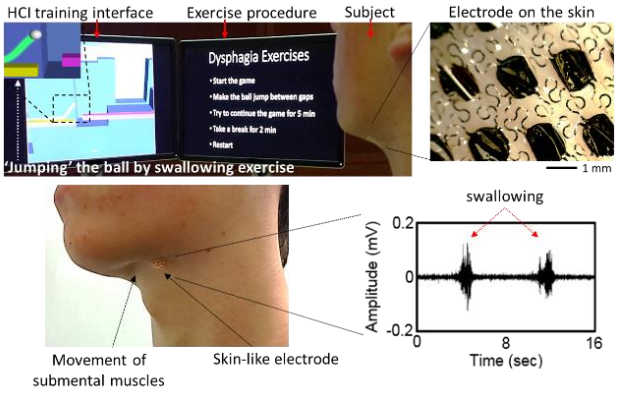
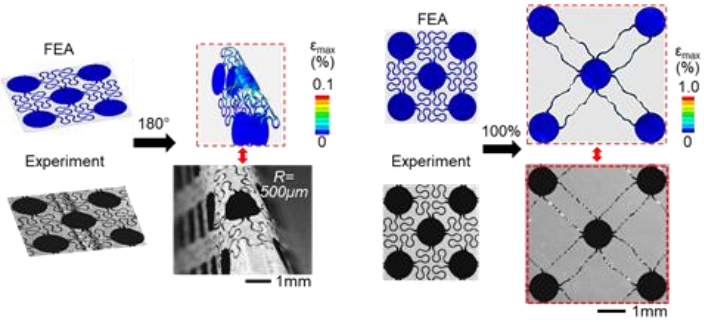
Abstract

There are rapid advances in developing portable, non-invasive, and wearable healthcare devices to improve the quality of human life. However, it is still challenging for long-term use of such devices because a fundamental mismatch exists between the conventional electronic systems and human tissues in terms of mechanics and materials. Recently, a new class of technology called skin-like electronics has been emerging. Since these unusual electronics have similar mechanical properties with the human skin, they can offer new avenues to improve and advance human healthcare including long-term human-computer/machine interfaces, real-time health monitoring, and point-of-care diagnostics. In this presentation, I will talk about the development of skin-like electronics which are fully integrated electronics taking the form of thin, stretchable membranes as combining rigid electrical and/or electronic materials with a soft, biocompatible, low-modulus elastomers. The first part of the presentation will discuss mechanics and materials for designing of skin-like electronics based on nanomembranes. Afterwards, applications of skin-like electronics for novel biomedical devices that monitor biopotentials and physiological parameters for human health monitoring and human-machine interfaces will be discussed.





Biography

Dr. Yongkuk Lee Joined at Wichita State University (WSU) as an Assistant Professor in the Department of Biomedical Engineering in August 2018. Before joining at WSU, Dr. Lee was a postdoctoral fellow in Mechanical Engineering at Georgia Institute of Technology. Dr. Lee received his Ph.D. in Electrical Engineering at West Virginia University in 2014. His research focuses on the fundamental and applied aspects of nanomechanics, biomolecular interactions, soft materials, and nano-microfabrication for soft/bio-hybrid electronic/engineered system development which can be used for various aspects of advancing human healthcare.