THE 16TH U.S.-KOREA FORUM ON NANOTECHNOLOGY: NANOMEDICINE FOCUSING ON SINGLE CELL LEVEL AND SENSORS RELATED TO HUMAN COGNITION AND BRAIN RESEARCH

UNIVERSITY OF CALIFORNIA, SAN DIEGO (UCSD), QUALCOMM INSTITUTE, CALIFORNIA

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WIRELESS ELECTRONIC TATTOOS

Nanshu Lu

University of Texas at Austin

Abstract

Merging human body with electronics and machines can enable internet of health (IoH), human-machine interface (HMI), as well as augmented human capabilities. However, bio-tissues are soft, curvilinear and dynamic whereas wafer-based electronics are hard, planar, and rigid. Over the past decade, stretchable high-performance inorganic electronics have emerged as a result of serpentine designs and transfer printing processes. In particular, epidermal electronics [1], a.k.a. electronic tattoos (e-tattoos) represent a class of stretchable circuits, sensors, and stimulators that are ultrathin, ultrasoft and skin-conformable [2]. This talk will introduce a dry and freeform "cut-solder-paste" method for the rapid prototyping of wireless e-tattoos [3, 4]. This method is applicable for thin film metals, polymers, ceramics [5], as well as 2D materials [6, 7]. Stretchability of the e-tattoos and their electromagnetic characteristics under deformation will be investigated. For wireless operation, we leverage near field communication (NFC) for wireless charging and Bluetooth low energy (BLE) for wireless data transfer. A strategy to wirelessly charge e-tattoos on-the-go will also be introduced.

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