In-Sensor Computing via Heterogeneous Integration towards Edge Intelligence

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Recent advances in heterogeneous integration technology have made it possible to combine multiple functionalities on a single system. Among various, remote epitaxy techniques can produce single-crystalline membranes on graphene, readily exfoliatable to form freestanding single-crystalline membranes. We have recently discovered that “any types” of single-crystalline compound materials, such as III-V, III-N, and complex oxides, can be epitaxially grown on 2D materials-coated substrates. 2D material is sufficiently thin such that crystalline growth can be guided by the substrate beneath 2D materials. The slippery 2D surface allows the epitaxial films to be released from the substrate while the substrate can be reused. Based on this technology, various electronic and optoelectronic components can be fabricated and integrated. Based on this membrane technology, heterogeneous integration of sensors and artificial neurons for edge computing attracts great interest for their applications in artificial intelligence of things (AIoTs). Here, I will discuss how this advanced technology revolutionizes conformal vision sensors integrated with neuromorphic components for edge computing towards AIoTs.

**Biography:** Kyusang Lee is currently an Assistant Professor of Electrical and Computer Engineering and Materials Science and Engineering departments at University of Virginia. He received his B.S. degree from Korea University in 2005, M.S. degree from Johns Hopkins University in 2009, and Ph.D. degree from University of Michigan in 2014, all in Electrical Engineering. He was a postdoctoral fellow in the Department of Electrical Engineering and Computer Science at the University of Michigan, and a postdoctoral associate in the Department of Mechanical Engineering at Massachusetts Institute of Technology (MIT). His research interests highlight the use of thin-film compound semiconductors in optoelectronic devices, with a particular emphasis on applications for imaging and artificial intelligence. He is the recipient of the NSF faculty early career award, AFOSR young investor program award, best student presentation award at the IEEE 38th Photovoltaic Specialist Conference and the UMEI postdoctoral fellowship. His works have been published in Nature, Science, Nature materials, Nature Nanotechnology, Nature electronics, Science Advances, PNAS and Nature communications etc.