**Single-crystalline nanomembranes for flexible/stackable electronics: third part**

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 In the context of the future of electronics, encompassing fields like bioelectronics, 3D integrated electronics, and bendable electronics, the demand for flexibility and stackability in electronic products has significantly increased. However, conventional wafer-based single-crystalline semiconductors find it challenging to keep pace with these trends due to their inherent attachment to thick, rigid wafers, rendering them inflexible and non-stackable. While polymer-based organic electronic materials offer mechanical compliance and cost-efficiency advantages, their electronic and photonic performance lags substantially behind that of single-crystalline inorganic materials. Over the past half-decade, our research group at MIT has been dedicated to addressing this performance-mechanical compliance dilemma. We have focused on developing methods to create cost-effective, flexible, and stackable single-crystalline inorganic systems. In today's presentation, I will delve into the strategies we have developed to realize this dream electronic system [1-5], and how these strategies introduce innovative approaches to advanced electronic manufacturing [6-11]. I will particularly highlight our groundbreaking remote epitaxy technique, capable of producing single-crystalline freestanding membranes from various compound materials with exceptional semiconducting performance. Additionally, I will showcase an unprecedented flexible and stackable system enabled by the stacking of these freestanding, flexible membranes.



**Biography**

Prof. Jeehwan Kim is a tenured faculty at MIT. His research group’s focuses on material innovations for next generation computing and electronics. Prof. Kim joined MIT in September 2015. Before joining MIT, he was a Research Staff Member at IBM T.J. Watson Research Center in Yorktown Heights, NY since 2008 right after his Ph.D. He worked on next generation CMOS and energy materials/devices at IBM. Prof. Kim is a recipient of 20 IBM high value invention achievement awards. In 2012, he was appointed a “Master Inventor” of IBM in recognition of his active intellectual property generation and commercialization of his research. After joining MIT, he continuously worked nanotechnology for advanced electronics/photonics. As its recognition, he received LAM Research foundation Award, IBM Faculty Award, DARPA Young Faculty Award, and DARPA Director’s Fellowship. He is now serving as Samsung Fellow. He is an inventor of > 200 issued/pending US patents and an author of > 50 articles in peer-reviewed journals. He currently serves as Associate Editor of *Science Advances*, AAAS. He received his B.S. from Hongik University, his M.S. from Seoul National University, and his Ph.D. from UCLA, all of them in Materials Science.