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SPEAKER SERIES

PRESENTS

Transform Electronics and Photonics by Novel Epitaxy and Nanofabrication

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Room: CBB 108 (in-person only)

LECTURE ABSTRACT

My group's general interests are in the area of nanostructured semiconductor materials and devices. We focus on developing innovative structures and device concepts through bottom-up epitaxial growth and top-down fabrication approaches to bring lasting impact to the field of electronics, photonics, and quantum technologies; and potentially medicine. In this talk, I will present two of the nanofabrication platforms we innovated recently and aim to address some of the pressing issues in nanofabrication and applications: (1)an unorthodox anisotropic etching method, metal-assisted chemical etching (MacEtch), that enables site-controlled semiconductor nanostructure top-down fabrication with unprecedentedly high aspect ratio and materials and structure versatility;[1-3] and (2) a 3D self-rolled-up membrane (S-RuM) nanotechnology platform for extreme miniaturization of passive electronic components, including inductors, transformers, and filters, for radio frequency integrated circuits (RFICs) and power electronics.[4,5] I will also present, if time allows, several examples of heterogeneous epitaxy including selective-area and van der Waals epitaxy.

1."Metal-assisted chemical etching in HF/H_2O_2 produces porous silicon", X. Li and P. W. Bohn, Appl. Phys. Lett. 77, 2572 (2000).
2. “High Aspect Ratio β-Ga2O3 Fin Arrays with Low Interface Charge Density by Inverse Metal-Assisted Chemical Etching, "ACS Nano, 13, 8, 8784-8792 (2019).
3. “Homoepitaxial GaN micropillar array by plasma-free photo-enhanced metal-assisted chemical etching,” J. Vacuu. Sci. Tech. A 39, 053212 (2021).
4."Three-dimensional radio frequency transformers based on a self-rolled-up membrane platform, "Nature Electron. 1, 305-313 (2018).
5. “Monolithic mTesla Level Magnetic Induction by Self-Rolled-up Membrane Technology," Sci. Adv. 6, eaay 4508 (2020).

SPEAKER BIOSKETCH

Prof. Xiuling Li received her B.S. degree form Peking University and Ph.D. degree from UCLA. Following post-doctoral positions at California Institute of Technology and University of Illinois, as well as industry experience at II-VI, Inc. (formerly EpiWorks, Inc.), she joined the faculty of the University of Illinois, Urbana-Champaign (UIUC) in 2007 and then relocated to UT Austin in Aug. of 2021. She held the Donald Biggar Willett Professorship in Engineering in the Department of Electrical and Computer Engineering (ECE) and the interim director of the Nick Holonyak Jr. Micro and Nanotechnology Laboratory at UIUC. She is now the Temple Foundation Endowed Professor in ECE at UT Austin. She has published >160 journal papers and holds >20+ patents, delivered > 120 invited lectures worldwide. Her research has been honored with the NSF CAREER award, DARPA Young Faculty Award, and ONR Young Investigator Award. She is a Fellow of the IEEE, the American Physics Society (APS), the Optical Society (OSA), and the National Academy of Inventors (NAI). She currently serves as a Deputy Editor of Applied Physics Letters.

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