PHYSICS COLLOQUIUM: Zoom Seminar

Ultrawide Bandgap Semiconductors for Future Power Electronics

Dr. Houqiang Fu
Assistant Professor, School of Electrical, Computer, & Energy Engineering
Arizona State University

Date:
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Time:
10:30 AM – 11:50 AM

Location:
Zoom

About The Speaker:

Houqiang Fu is an Assistant Professor in the School of Electrical, Computer, and Energy Engineering at Arizona State University. He received his Ph.D. in Electrical Engineering from Arizona State University. He was an assistant professor in the Department of Electrical and Computer Engineering at Iowa State University from 2020 to 2022. His research group at ASU focuses on novel wide and ultrawide bandgap semiconductor materials, MOCVD growth, and devices for next-generation electronics and optoelectronics. His work has been chronicled in over 200 journal and conference publications, 4 book chapters, and 14 patents. He received the NSF CAREER Award, Electronics Young Investigator Award, ISU Regents Innovation Fund Award, and ASU Palais Outstanding Doctoral Award.

Abstract:

Recent years have witnessed a skyrocketing demand for more energy and electricity that is driven by fast-growing power-hungry technologies such as artificial intelligence (AI), data centers, electric vehicles (EV), etc. Power electronics plays a central role in the energy efficiency of these technologies as well as in renewable energy, smart grid, and greenhouse gas emission reduction. However, state-of-the-art Si-based power devices are facing tremendous challenges in coping with this energy demand due to Si material limits. In the U.S., the losses included by Si technology account for nearly 10% of the total electricity, which is more than all the electricity generated by renewable energy sources combined. Although wide bandgap (WBG) semiconductors (e.g., GaN and SiC) have shown better performance than Si, ultrawide bandgap semiconductors (e.g., Ga2O3, AlN, BN, and diamond) are even more attractive for power electronics and can potentially offer far superior performances due to their unique material properties. This talk will discuss our recent progress on two of the promising UWBG semiconductors, i.e., Ga2O3 and AlN. I will talk about Ga2O3 heterostructures and heterojunctions for mobility enhancement and bipolar devices and anisotropic electrical properties in Ga2O3 devices. Our recent demonstration of the first kV-class AlN power diodes will also be discussed.

Zoom Link:

https://ucmerced.zoom.us/j/82136215182?pwd=bXdIK3Y5OStBdmJUbnFkbG4zUlQ3QT09&from=addon

For more information, contact: Hui Cai
hcai6@ucmerced.edu