Qiangfei Xia, Ph.D.
Department of Electrical & Computer Engineering
University of Massachusetts, Amherst

Dr. Xia is currently an associate professor of Electrical & Computer Engineering at UMass Amherst and head of the Nanodevices and Integrated Systems Lab (http://nano.ecs.umass.edu). Before joining UMass, he spent 3 years at Hewlett-Packard Laboratories.

Dr. Xia’s research interests include post-CMOS nanodevices, device physics, integrated nanosystems and enabling nanotechnologies, with applications ranging from analog computing, neuromorphic computing, reconfigurable RF system to hardware security.

He is a recipient of DARPA Young Faculty Award (YFA), NSF CAREER Award, and the Barbara H. and Joseph I. Goldstein Outstanding Junior Faculty Award. Dr. Xia is a senior member of IEEE and a senior member of SPIE. He received his Ph.D. in Electrical Engineering in 2007 from Princeton University.

Memristive Nanodevices and Arrays for Brain-inspired Computing and Beyond

Developing electronics beyond Moore’s Law requires revolutionary vision in novel devices, disruptive technologies, new materials and alternative computer architecture. Memristor (resistance switch) is an emerging nanoelectronic device that uses resistance states to represent digital or analog information.

In this talk, I will first describe our recent efforts in developing high performance HfO₂ and SiO₂ based memristive devices and arrays, including 2 nm scaling and 8 layer stacking. I will then showcase the integration of large memristor arrays (128×64) as multilayer neural networks with applications in analog signal/image processing and machine learning.

After a brief introduction of our synaptic and neural emulators with memristors, I’ll finally discuss other applications of memristors such as radiofrequency switches and true random number generators.