

# IRPS 2021 – Wide-bandgap Workshop (GaN)

**Brief summary:** GaN is an excellent material for the fabrication of power transistors. These devices are now rapidly finding applications in next-generation power conversion systems with 600-650V transistors already commercially available. Higher voltages are currently targeted (up to 1.2 kV). The success of GaN depends on the understanding of key failure modes and mechanisms. A market transformation is now underway, and the next step is to demonstrate and qualify high reliability.

This workshop focuses on the hot topics in the field of GaN reliability:

1. What are the largest remaining barriers to widespread commercial adoption?
2. Soft vs. Hard switching: What's new? How do you qualify devices in a dynamic regime?
3. GaN devices do not have avalanche capability—Is this a problem or an opportunity?
4. Extrinsic vs. Intrinsic reliability: What are the biggest challenges?

This workshop will address these questions by stimulating discussion on the issues that presently limit the reliability and performance of GaN-based HEMTs. It will be a natural lead-in for the subsequent workshop on SiC reliability.

## Workshop organizers

### Dr. Shireen Warnock, MIT Lincoln Laboratory

Dr. Shireen Warnock is a technical staff member in the RF Technology Group. Her research interests include III-V materials systems, device characterization, and reliability.

Prior to joining the Laboratory, Dr. Warnock was a graduate student at the Massachusetts Institute of Technology (MIT), where her research focused on the dielectric reliability of gallium nitride metal-insulator-semiconductor high electron mobility transistors for power applications.

Dr. Warnock has authored or co-authored a number of journal and conference publications in the areas of gallium nitride device reliability. She currently serves on the Wide Bandgap sub-committee for the IEEE International Reliability Physics Symposium.

Dr. Warnock received BS, MEng, and PhD degrees in electrical engineering from the Massachusetts Institute of Technology.



### Prof. Matteo Meneghini, University of Padova

Matteo Meneghini is associate professor at the Department of Information Engineering at the University of Padova. His main interest is the characterization, reliability and simulation of compound semiconductor devices (LEDs, Laser diodes, HEMTs).

Within these activities, he has published more than 300 journal and conference proceedings papers.

During his activity, he has cooperated and/or co-published with a number of semiconductor companies and research centers including OSRAM-OptoSemiconductor, Panasonic Corporation, Universal Display Corporation, NXP, ON Semiconductor, IMEC, Infineon, Fraunhofer IAF, MIT, UCSB.

Meneghini is a Senior Member of IEEE and a member of the SPIE. He has served as vice- and sub-committee chair for IEEE-IRPS, and as a committee member for several other conferences (including IEDM and WIPDA).

