

WORKSHOP: UWBG Materials for High Performance Applications

PROGRAM MANAGER(S): Tom Kazior

DATE: Tuesday, October 19, 2021

TIME: 3:15pm – 5:30pm

ROOM NAME: Matt Billone

DESCRIPTION

Future DoD systems require higher performance (e.g., higher output power RF devices, higher power handling switching transistors and protection circuits, high temperature transistors) to meet mission requirements. Just as SiC and GaN technology provided a leap ahead in capability over legacy Si and GaAs device technology, the Ultra-Wide BandGap (UWBG) semiconductors (e.g., AlN, cBN, diamond, Ga₂O₃) show promise as the next leap in RF and power electronics. However, these materials and associated devices are in their infancy. The objective of this workshop is to define technical challenges and develop community awareness of these challenges. The workshop will include an overview of potential applications and ongoing research in UWBG materials and devices, including new DARPA initiatives (UWBG seedlings, Heterogeneous Heterostructures (H2) Microelectronics Explorations program), applications and research funded by the service branches (Air Force, Army, and Navy), and also a commercial perspective. The workshop concludes with a discussion on the unique UWBG materials and device challenges, as well as suggestions for potential paths forward.

AGENDA

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| 3:15pm | Introduction/Overview Dr. Tom Kazior, DARPA, Program Manager |
| 3:30pm | DoD System Drivers and Device Characteristics for Next Generation Power Electronics and RF Amplifiers Dr. John Zolper, Defense Technology Strategy, Principal Engineering Fellow, Raytheon Technologies |
| 3:50pm | Ultra-Wide Bandgap Semiconductors: Materials, Devices, and Applications Dr. Mark Hollis, Senior Member of the Technical Staff, MIT Lincoln Laboratory |
| 4:10pm | Ultra-Wide Bandgap Semiconductor Materials for Next-Generation Power, RF, and Switching Devices Dr. David Meyer, Branch Head, Electromagnetics Technology Branch, Naval Research Laboratory |
| Afternoon Break: 4:25pm-4:40pm | |
| 4:40pm | Army UWBG RF Electronics Center Dr. Joe Qiu, Program Manager, Solid-State Electronics and Electromagnetics, Army Research Office |
| 4:55pm | A Snap Shot of 20 Years of Diamond Research and Production Dr. Daniel Twitchen, Chief Technologist, Element Six |
| 5:10pm | Ultra-Wide Bandgap AlN and Ga₂O₃ Semiconductor Devices: Outlook and Commercial Applications Dr. Jacob Leach, Chief Technology Officer, Kyma Technologies |
| 5:25pm | UWBG Challenges: Paths Forward Dr. Tom Kazior, DARPA, Program Manager |
| Workshops Conclude at 5:30pm | |

QUESTIONS

Please contact Tom Kazior OR the ERI Summit mailbox for more information following this workshop at thomas.kazior@darpa.mil OR ERI-Summit@darpa.mil.