



Basic Research Innovation Collaboration Center (BRICC)
4100 N Fairfax Drive, Suite 450
Arlington, VA 22203

Combined MURI/COE/Core Projects Review

Agenda Day 1 | November 1, 2023

Time	Topic	Speaker
8:00	Check-in	
8:30	Welcome and logistics	Art Edwards, Ken Goretta, and Michael Yakes - AFOSR
8:40	Overview of MURI	Rongming Chu, Penn State U
8:55	Overview of COE	Ron Schrimpf, Vanderbilt U
9:10	Discussion of coordination among projects	

Theory Session

9:30	Radiation-induced crystalline defects in GaN/AlN/AlGaN by molecular dynamics	Mia Jin, Penn State U
9:55	Threshold defect formation and properties in GaN/AlN/AlGaN	Blair Tuttle, Penn State U
10:20	BREAK	
10:50	Defect processes enabled by radiation-induced excess electron-hole pairs – A comparative study of Ga ₂ O ₃ , GaN, and SiC	Sok Pantelides, Vanderbilt U
11:15	Fundamental studies of radiation damage mechanisms in wide-band-gap semiconductors	Chris Van de Walle, UCSB
11:40	Bulk and near-interface, charged point defects in SiC, SiO ₂ , and GaN	Renee van Ginhoven, AFRL Directed Energy
12:05	LUNCH	

Theory Session Continues

1:15	Local defect properties and their signatures in electrical probes of GaN defect spin dynamics	Michael Flatte, U Iowa
1:40	Thermalization of radiation-induced carriers in insulators and wide bandgap semiconductors	Max Fischetti/Dallin Nielsen, U Texas at Dallas

2:05	Intrinsic and extrinsic defects in AlN and AlGaN	Art Edwards, AFRL Space Vehicles
2:30	Discussion of expectations for remainder of day	
2:40	BREAK	
3:00	Panel discussion: Connecting theory to experiments for understanding radiation effects	
5:00	Panel discussion: Emerging needs in radiation effects (participants from the advisory board)	
	Review Adjourn	

Agenda Day 2 November 2, 2023		
Time	Topic	Speaker
8:00	Check-in	
8:30	Overview of Day 2	
Sample Fabrication Session		
8:40	Development of high-voltage and radiation-hard vertical GaN p-n diodes	Jim Speck, UCSB
9:05	Development of high-voltage and radiation-hard vertical β -Ga ₂ O ₃ Schottky diodes	Esmat Farzana, UCSB and Iowa State U
9:20	Engineering radiation performance through wide bandgap transistor design – extreme-permittivity dielectrics and tri-gate geometry	Siddharth Rajan, Ohio State U
9:45	Alloying and doping effects on radiation hardening properties of wide gap semiconductors and scintillator crystals	Arnold Burger, Fisk U
10:10	BREAK	
Device DesignSession		
10:25	Design and fabrication of GaN device test structures for collaborative research on radiation effects	Rongming Chu, Penn State U
10:50	Extreme permittivity for electric field management: Overcoming SEEs in wide bandgap space power electronics	Shin Mou and Adam Neal, AFRL Materials and Manufacturing
11:15	Heterogeneous integration of GaN-HEMTs for RF applications	Mona Ebrish, Vanderbilt U

11:40	Transient current induced by heavy ion single event in field-plate and super- heterojunction GaN devices	Jianan Song, Penn State U
12:05	LUNCH	
Defect Spectroscopy Session		
1:15	Cavity formation in GaN/AlN by swift heavy ion irradiation	Xing Wang, Penn State U
1:40	High-resolution X-ray diffraction to characterize radiation-induced defects and strain in GaN epitaxial structures	Reeja Jayan, Carnegie Mellon U
2:05	Electron spin techniques to investigate radiation damage in GaN based devices	Pat Lenahan, Penn State U
2:30	DLTS and DLOS studies of radiation effects in GaN and Ga ₂ O ₃ for electronics and AlGaInP for space PV	Steve Ringel, Ohio State U
2:55	Impact of radiation-induced defects on WBG/UWBG transistors	Aaron Arehart, Ohio State U
3:20	POSTER SESSION	
	Vanderbilt	
	Ricky Cadena	Low-Energy Ion-Induced Single-Event Burnout in Gallium Oxide Schottky Diodes
	Sajal Islam	Device modification brings SEB threshold enhancement in β-Ga ₂ O ₃ Schottky Diodes
	Aditha Senarath	Heavy ion-induced single-event effects in vertical GaN diodes
	Stefania Esquer	Single event functional interrupt (SEFI) characterization of the Armv7-M instruction set architecture
	Bella Wynocker	Random Telegraph Noise and Radiation Response of 80 nm Vertical Charge-Trapping NAND Flash Memory Devices with SiON Tunneling Oxide
	Grant Mayberry	Defect Generation and Dynamics in Wide-Bandgap Semiconductor Materials
	Xuyi Luo	Low-frequency noise and DLTS in <i>n-p-n</i> Si bipolar junction transistors irradiated with Si ions
	Xun Li	Irradiation- and Bias-Stress-Induced Charge Trapping and Gate Leakage in AlGaIn/GaN HEMTs
	Zixiang Guo	Total-Ionizing-Dose Effects in IGZO Thin-Film Transistors with SiO ₂ Oxygen-Penetration Layers
	Tianfang Liu	Proton Total Ionizing Dose Effects in GaN FinFETs
	Ohio State	
	Quinn Shua	Traps and Radiation Effects in AlGaO Schottky Diodes and Al ₂ O ₃ /Ga ₂ O ₃ MIS Capacitors
	Penn State	

	Farshid Reza	Modeling swift ion irradiation in GaN/AlN/AlGaIn by molecular dynamics
	Alex Hauck	Threshold defect formation and properties in GaN/AlN/AlGaIn
	Mahjabin Mahfuz	TEM analysis of SHI irradiation induced structural defects in GaN
	Yixin Xiong	Design and Fabrication of GaN Device Test Structures for Collaborative Research on Radiation Effects
	Nate Martin	Effects of Gamma Irradiation on GaN devices
	Jianan Song	Transient Current Induced by Heavy Ion Single Event in Field-Plate and Super-Heterojunction GaN Devices
	Carnegie-Mellon	
	Renuka Hyderkhan	High resolution X-ray diffraction to characterize radiation induced defects and strain in GaN epitaxial structures
	Duke	
	Md Sazzadur Rahman	IETS on GaN HEMTs
	Md Sazzadur Rahman	AC transconductance and conductance techniques to investigate defects in GaN HEMTs
4:50	Review Adjourn	

Agenda Day 3 November 3, 2023		
Time	Topic	Speaker
8:00	Check-in	
8:30	Overview of Day 3	
Radiation Effects Experiments Session		
8:40	New insights into the low-frequency noise of GaN-based HEMTs and Si MOS transistors	Dan Fleetwood, Vanderbilt U
9:05	Single event effects in wide bandgap high voltage devices	Sajal Islam, Vanderbilt U and Enxia Zhang, UCFU
9:25	Effects of gamma irradiation on GaN devices	Nate Martin, Penn State U
9:50	Response of wide-bandgap semiconductors to energetic heavy-ion irradiation	Maik Lang, U Tennessee
10:15	Understanding radiation-induced defects in GaN	Tania Roy, Duke U

	devices by electrical characterization techniques	
10:40	Perspectives on radiation damage of space-based electronics (Stefania Esquer and Jesse Mee	AFRL Space Vehicles
11:00	BREAK	
Breakout Meetings		
11:10	Advisory board	
	MURI Team	
	COE Team	
12:00	LUNCH	
1:00	Discussion and feedback	
2:00	Review Adjourn	