Modeling, Testing, and Simulation of Heavy-Ion Basic Mechanisms in Silicon Carbide Power Devices

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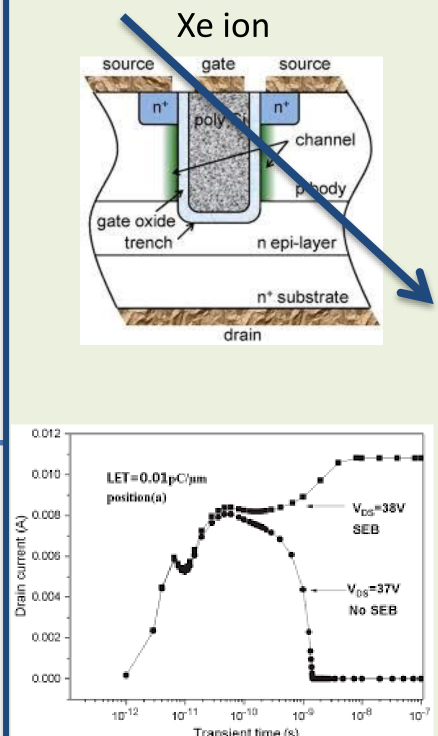
Research Objectives:

- Make results available to enable device manufacturers to harden SiC power devices to space SEE.
- Develop physical models for TCAD simulation tools that will replicate the unique effects observed.
- Design unique radiation experiments that expand the knowledge base of SiC physics
- Investigate the basic physical mechanisms underlying the unique single event effects (SEEs) observed in SiC power devices.



Single Event Burnout of Power MOSFET

Approach:

- Validate tools and techniques against experiment.
- Develop models and techniques necessary to simulate experimental observations.
- Design electrical and heavy-ion radiation experiments to isolate physical mechanisms of SiC response
- Analyze observed effects and underlying physics of SiC heavy ion response

Potential Impact:

- Reduction in size, weight, power for power management and distribution (PMAD) of future space missions.
- Road map to radiation qualification of SiC power devices for space missions.
- Radiation-robust SiC power diodes and transistors available from major device manufacturers.