Department of Electrical and Computer Engineering

TEXAS TECH UNIVERSITY
Edward E. Whitacre Jr.
College *of* Engineering

Spring 2024 Seminar Series

Seminar Title: ***Advancing High Voltage Power Module Packaging: Strategies for Partial Discharge Mitigation***

Time: 2:00-2:50 PM, Friday, Apr 12, 2024
Location: Holden Hall 150

Speaker:
Xiaoqing Song
University of Arkansas

Abstract:
High voltage (>10 kV) power semiconductor modules play a crucial role in medium to high voltage power conversion for transportation electrification, power distribution, renewable energy systems applications. The superior characteristics of wide bandgap materials, like silicon carbide (SiC) significantly enhance the blocking voltage capability of power devices. The remarkable high blocking voltage capability of recently reported SiC devices can significantly simplify converter topologies by eliminating the need for series connection of power devices or modular converters, leading to enhanced efficiency, power density, and reliability. However, the elevated voltage ratings of these power modules introduce additional challenges in power module packaging, particularly concerning partial discharge (PD), which can accelerate dielectric material aging and lead to device failure. This presentation aims to delve into the voltage insulation challenges, shed light on the technical gaps inherent in high voltage power module packaging, and provide insights into strategies for mitigating PD.

Speaker Bio:
Dr. Xiaoqing Song received the B.S. and M.S. degrees with Beijing Institute of Technology, China, in 2009 and 2012, respectively, and received the Ph.D. degree with North Carolina State University in 2017, all in electrical engineering. Since August 2022, he has been with the University of Arkansas, Fayetteville, where he is currently an Assistant Professor in the Department of Electrical Engineering and Computer Science. From 2017 to 2022, he was working with ABB U.S. Corporate Research Center as a principal research scientist and led multi-discipline research and R&D projects in the field of solid state and hybrid circuit breakers, protection coordination in low voltage and medium voltage DC distribution systems. Dr. Song's current research interests include wide bandgap power semiconductor devices, power electronics packaging and solid-state switch based power system protection. Dr. Song has published more than 60 peer reviewed journal and conference papers, two book chapters and filed 14 U.S. and international patents. He is the recipient of 2016 Outstanding Young European Power Electronics (EPE) Association Member Award, 2020 ABB Inventor of the Year Award and 2021 ABB Publisher of the Year Award, ITEC 2022 Best Paper Award. He is IEEE senior member and an Associate Editor of Open Journal of Power Electronics.