

**Notice and Invitation**  
Oral Defense of Doctoral Dissertation  
The Volgenau School of Engineering, George Mason University

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Bachelor of Science,  
Shanghai Jiaotong University, Shanghai, China, 2011  
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**Gallium Nitride Gas Sensors and Cross-Reactive Sensing for Precise Discrimination**  
Tuesday, November 13, 2018, 10:30am -11:30am  
Engineering Building, Room 4801  
All are invited to attend.

**Committee**  
Dr. Qiliang Li, Chair  
Dr. Abhishek Motayed  
Dr. Dimitris Ioannou  
Dr. Rao Mulpuri  
Dr. Erhai Zhao

**Abstract**

The global gas sensor market is anticipated to reach \$3.4 billion by 2025. The increasing demand for smart and wearable gas sensors has propelled the development of new-generation nanoscale gas sensors. In this dissertation, a hybrid gas sensor based on gallium nitride (GaN) nanowires decorated with metal oxide is investigated. An IC compatible fabrication process was presented, including the top-down etching method to pattern the GaN nanowire and metal oxide thin film deposition through sputtering. The sensor performance optimization was conducted through comprehensive device modeling and simulation using Sentaurus TCAD. The advanced topics, e.g. microheater, ohmic contact resistance, and process variation control were also investigated thoroughly. In addition, a cross-reactive sensing strategy based on gas sensor arrays was also investigated for precise discrimination against similar chemical vapors. The results indicated that GaN nanowire sensors and cross-reactive sensing are very promising for smart gas sensing applications.