

# OSE SEMINAR SERIES

Dr. Nathan Jackson

UNM Mechanical Engineering Department



Thursday, September 19, 2019 at CHTM, Room 101 from 12:15 AM to 1:15 PM

## ***PiezoMEMS: A Decade of Research and Innovation***

### **Abstract:**

Microelectromechanical Systems (MEMS) or optical analogous MOEMS are widely used in everyday applications, such as telecommunications (RF filters), accelerometers, gyroscopes, microphones, ultrasound, digital micromirrors, optical shutters, and numerous other applications. Research into enhancing device performance, developing new materials, and discovering new applications is of importance. This talk will give a high-level overview of specific PiezoMEMS applications that the speaker has targeted over the last decade, including: energy harvesting for IoT and leadless pacemakers, atomizers, and acoustic resonators.

The talk will highlight key advances, including the development and enhancement of thin film piezoelectric material Aluminum Nitride (AlN), which is the functional material used in most of the described applications. This will include advances made in developing flexible piezoelectrics for Biomedical applications. Combining AlN with MEMS fabrication has started a new platform technology that has led to advances in various applications, including high power density MEMS vibrational energy harvesters ( $2.5 \text{ mW/cm}^3$ ), ultra-efficient (80%) drug delivery through aerosol generation, and high Q-factor acoustic resonators. The talk will also discuss future smart materials and their use in MEMS and applications relating to optical MEMS.

### **Biography:**

Nathan Jackson is an Assistant Professor in the Mechanical Engineering Department at UNM. He received his Ph.D in Biomedical Engineering from Arizona State University. Prior to UNM he worked at a microelectronics research institute (Tyndall National Institute) located in Cork, Ireland as a Senior Researcher and head of the PiezoMEMS team. His research interests are in the area of MEMS, BioMEMS, piezoelectrics, smart materials, neural interfaces, and flexible/stretchable circuits. He has developed MEMS devices for vibration energy harvesters, particle sensors, atomizers, acoustic resonators, robotics, tactile sensors, and ultrasound transducers. He is a technical committee member for IEEE MEMS, SPIE Microtechnologies, E-MRS, and IEEE NANO conferences. He is a senior member of IEEE and has published more than 60 peer reviewed journal publications focused on MEMS and functional materials. He has 10 patents licensed to various companies, and he was a finalist for inventor of the year in Ireland in 2016.

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