1. **Research Title:** Analysis of Ultra Wide Band Gap (UWBG) materials for Electronic and Optoelectronic Applications in Extreme Environments
2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level:** Electrical Engineering, Electrical and Computer Engineering, Physics, Chemistry, Materials Science and Engineering (M.S. or PhD. Level)
4. **Objectives:** Study the fundamental properties of ultra-wide bandgap (UWBG) semiconductors (e.g. AlN, Ga_2O_3, diamond, c-BN) in extreme environments (e.g. Space, high-temperature)
5. **Description:** UWBG semiconductors have been of interest as their large band gaps result in large breakdown voltages which are useful for high power handling devices. However, how and what defects form during growth or in extreme environments such as high temperature (T > 300°C) or high radiation (e.g. heavy ion radiation > 10 MeV-cm2/mg) is not well understood. It is vital to understand defect states as they can impact the electrical performance of devices made from these films during operation. This information can be used to optimize growth parameters of thin film UWBG materials and inform the design of device stacks. Therefore, in this topic, we investigate defects in UWBG materials through various characterization techniques that all us to learn more about these defects, their role in the band structure and electronic performance of the material. The goal of this project is to generate critical and novel knowledge to evaluate UWBG materials in extreme environments for the Air Force and DoD.
6. **Research Classification/Restrictions:** This research is unclassified and has no ITAR restrictions.
7. **Eligible Research Institutions:** Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati

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