

**What our lab does:**

- We grow **ultra-wide band gap semiconductors** for use in optoelectronic and electronic devices.
- We develop **new equipment technologies** to access new synthesis capabilities for both bulk and thin film growth

**How we do this:**

- We use a variety of techniques to grow nitrides, including the **ammonothermal method** and novel **flux-based approaches**
- We grow thin films using traditional and a novel **high pressure MOCVD system**

**Why we are investigating this area:**

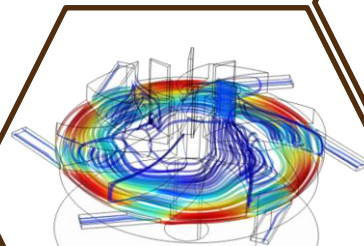
- The **sustainable electrification** of the USA demands efficient electric power conversion. Materials we are developing will eliminate waste heat production and enhance performance.
- **Disinfection of water and surfaces** is critical to our health. High power UV emitters offer a solution but require better materials and synthesis approaches for widespread use.

**Activities:**

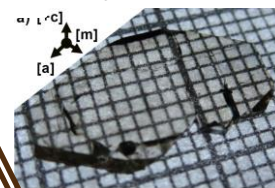
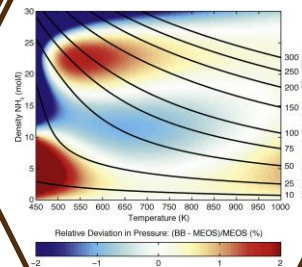
Synthesis      Equipment

Modeling/  
Theory

Demonstrative  
Devices

**High Pressure MOCVD  
Tool Development**[10.1016/j.jcrysgro.2021.126155](https://doi.org/10.1016/j.jcrysgro.2021.126155)**Single Crystal  
Ammonothermal GaN**

$T_{melt} \approx 4000 \text{ }^\circ\text{C}$   
 $P_{melt} \approx 12 \text{ GPa}$

[10.1016/j.jcrysgro.2014.06.017](https://doi.org/10.1016/j.jcrysgro.2014.06.017)**Modeling/Theory**[10.1016/j.supflu.2015.07.032](https://doi.org/10.1016/j.supflu.2015.07.032)