

# Materials Science & Engineering and Metallurgical Engineering Graduate Seminar

Wednesday, April 3 2019, 4:10-5:00PM, FASB 295

**Joshua Winger, BS/MS candidate MSE**

## A Model of Grain Growth in CdTe Thin Films During CdCl<sub>2</sub> Treatment

Solar energy is a crucial part of any plan to power tomorrow's world. Traditional solar conversion materials face challenging cost-reduction pathways as their efficiency has begun to mature towards theoretical values. Cadmium telluride solar cells are a competitive alternative that have a proven track record of matching or beating the price point of popular silicon cells. CdTe solar cells have much more room to grow in terms of efficiency, which can lead to continued price reduction. This work revolves around a critical heat treatment step for CdTe solar cells that improves electronic properties as well as reforms the microstructure of the thin film. This model of grain growth developed alongside experimental results and characterization can aid in controlling CdTe thin film microstructure leading to higher efficiency devices.

**Samuel Sprawls, PhD candidate MSE**

## Neutron and Gamma Radiation of GaN

Gallium nitride has great potential in radiation-hard, high-power electronic devices due to its wide bandgap and strong atomic bonding. In this study, we investigate how growth orientation of GaN affects its resistance to gamma and neutron radiation. Relatively little is known on how radiation damage in GaN is affected by growth direction. And gamma and neutron radiation are the focus as they are difficult to shield. In this talk, I will focus on explaining three of the characterization techniques we are using to understand the damage done to the samples. Turn-on voltage is calculated from a current voltage sweep and gives an overview of device performance. Circular transmission line measurements extract the resistivity and contact resistance. Electroluminescence gives insight to how carriers are recombining in the PN diode. This project is ongoing, but I will present some of the challenges we have faced so far and our preliminary results.