

## Thrust Area 5: Carbon Capture & Nuclear

### *Planning Grant: Enhanced Thermal Performance and Microstructure Simulation of Nuclear Fuels*

**PI:** Justin Schwartz

**Description:** The objective of this proposal was to perform preliminary investigations to determine the viability of improved oxide nuclear fuels through high thermal conductivity coatings such as “BeO.” To meet Florida’s sustainable energy demands, we pursued the option of enhanced oxide nuclear fuel performance by considering the potential for improved thermal behavior through high thermal conductivity oxide coatings. This work included a literature search of past investigations of the impact of enhanced thermal conductivity on nuclear fuel and reactor performance, the temperature and irradiation dependence of the thermal conductivity of BeO and other high thermal conductivity oxides, the chemical and thermal compatibility of BeO and nuclear fuels (UO<sub>2</sub>, PuO<sub>2</sub>, ThO<sub>2</sub> and MO<sub>x</sub>), and initial studies into BeO coatings on HfO<sub>2</sub> particles, where HfO<sub>2</sub> serves as a benign surrogate for nuclear fuel oxides. We conducted an evaluation of possible coating processes and measured their thermal behavior. We used these findings to pursue external funding.

**Budget:** \$15,000

**University:** FSU

### Executive Summary

This project has been completed.