

# Keith William Gneshin



**Graduate Institution:** The University of Utah

**Graduate Discipline:** Chemical Engineering

**Hometown:** Dunkirk, NY

**Relevant SC Research:** Basic Energy Sciences

## Research Interest:

My past and present work focuses on pyrolysis, the science of thermal decomposition. I have studied pyrolysis at the fundamental level (carcinogen formation in cigarette smoke) and the applied level (synthesis of carbon nanoparticles from biomass). Currently, I am studying the pyrolysis of coal in large blocks to better understand the relevant phenomena when large heat and mass transfer resistances are present. Under these conditions, heat transfer, mass transfer and reaction kinetics are all highly coupled, making the simplification of the governing equations difficult. My work is focused on identifying the dominant mechanism for mass transfer during pyrolysis at very slow heating rates. A more detailed understanding of this mechanism will give a deeper understanding of seam permeability and CO<sub>2</sub> sequestration potential after the thermal decomposition of deep coal seams.

## About Me:

I have been fortunate enough to have a 12-year career in scientific research, reaching back to my undergraduate work at the Colorado School of Mines. Following a masters degree at Stanford University, I spent over 3 years running a small research and development company that focused on the development of biomass-based carbon nanomaterials.

Currently, I am completing my PhD at the University of Utah, examining fundamental aspects of pyrolysis in deeply-buried coal seams. I have been honored with the Outstanding Graduating Senior Award at the Colorado School of Mines and the John Zink Combustion Scholar Award at the University of Utah. I am an active member of the American Chemical Society.

As a classically-trained chemical engineer, I am always focused on the “rate-limiting step,” the technical problem that holds a technology back from greater acceptance. As much as I appreciate fundamental science, my engineering roots always compel me to stay at the intersection of new technologies and old problems. As such, my career aspirations straddle the entrepreneurial and academic spheres. First, I am interested in measuring and developing models for common transport properties (thermal conductivity, mass diffusivity) in complex materials to improve modeling and design efforts. I am also interested in designing and testing more sophisticated reactors for high-efficiency pyrolysis of biomass. I believe that improved design can greatly lower the price of bio-derived oils, making them competitive in the fuels market.

In my free time, you can find me skiing, hiking, climbing or biking to the tops of mountains across the western US. I’ve climbed 70 of the 100 highest peaks in Colorado. I’ve yet to break any bones.



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Science