



The Alabama Collaborative for  
Materials Exploration (ACME)

## Research Seminar Series

**Professor Matthew Pasek**

*School of Geosciences  
University of South Florida*

**Tuesday, January 18<sup>th</sup>, 2022**

**10:00 AM CST**

Register for Zoom [here](#)

### **The metamorphic effects of lightning on geomaterials and understanding the formation of fulgurites**

When lightning strikes sand, soil, or rock, it can induce a rapid change in the solid material, ultimately forming a glassy rock termed a fulgurite. Because the energy of a lightning strike is deposited rapidly ( $\mu\text{s}$  to ms), the target material is altered in a way that is not commonly encountered in geology, with some of the closest analogs to fulgurites being rocks subjected to extraterrestrial impact. In this talk, I will discuss some of the unusual features that result from lightning striking geomaterials: from the rapid alteration of minerals such as zircons, to the change in bulk chemistry such of reduction of silicates to silicides. These changes can be used to understand the sources of an electric discharge that formed a fulgurite (i.e., a lightning strike vs. a downed power line), as well as the energy of a lightning strike.

**Biography:** Matthew Pasek is a professor in School of Geosciences at USF. He joined USF in 2009, after receiving his BS in Chemistry and Geology from the College of William and Mary, and a PhD in planetary science from the University of Arizona. He teaches geochemistry courses at the undergraduate and graduate level. Dr. Pasek's research interests are in the field of geochemistry, cosmochemistry, and the scientific understanding of the origin of life. His research focuses around the element phosphorus, and how the first phosphorus molecules were incorporated into early life or the chemistry that preceded life. In addition, his work focuses on chemical changes of phosphorus and the properties of these changes on extraterrestrial minerals and on other planets, as well as by biology on the earth. In addition to studies of phosphorus, Dr. Pasek studies the formation of rocks formed by lightning strikes, termed fulgurites, which are some of the few metamorphic rocks known to Florida. His research has been supported both by NASA and the NSF.

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