# IOWA STATE UNIVERSITY
## Department of Mechanical Engineering

# Designing thermochemical reactors for solar-powered fuel production


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**(German Aerospace Center)**


***Please note this seminar takes place in 2300 Marston at 2:30 pm***

**Seminar on Monday, March 20, 2017 at 2:30 pm in 2300 Marston**

**Seminar host: Gap-Yong Kim**


### Abstract

The energy in about 90 minutes of sunlight hitting the earth's surface is enough to satisfy current human energy needs, of all types, for a full year. With such an abundant resource, and the ability to focus sunlight for high heat fluxes and temperatures, we can discover ways to use the energy beyond just producing electricity. Solar fuels is one exciting use, where process heat from concentrated sunlight drives chemical cycles to produce renewable energy carriers needed for transportation and energy storage. This presentation will cover the newest research in developing solar powered reactors for producing fuels like H2 and CO. The idea space contributing to these reactors is currently wide and advancing fast. It involves ideas like rotating monolithic structures, moving particles, porous structures, vacuum systems, and integrated heat recovery, all while working at temperatures up to 1600 °C. Some of the newest and most unique concepts will be presented in this talk. A combination of thermodynamic analysis, numerical modeling, and experimental methods will be shown to explain how the concepts are turned into reality. It will be discussed how these concepts fit into a long-term road-map leading to solar fuels as a competitive technology for our energy carrier needs.


### Bio

Dr. **Justin Lapp** is a research scientist and project leader within the Institute of Solar Research at the Deutsches Zentrum Für Luft- und Raumfahrt (German Aerospace Center). He is a member of the Solar Process Technology team, which seeks to develop new means of harnessing concentrated solar radiation for high-temperature thermochemical and thermal processes. Justin's expertise is in heat transfer modeling and analysis, with a focus on numerical methods for radiative heat transfer, ray tracing, and mixed mode heat transfer. He holds a PhD from the University of Minnesota where he studied in the Solar Energy Laboratory, as well as degrees from Clemson University and Rose Hulman Institute of Technology. He is also an active member of the ASME Solar Energy Division.

***This seminar counts towards the ME 600 seminar requirement for Mechanical Engineering graduate students.***

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