# SAMUEL GINN COLLEGE OF ENGINEERING
# CHEMICAL ENGINEERING
## DISTINGUISHED SEMINAR SERIES

**FALL 2017**

**DR. HONGFEI LIN**
**Associate Professor**
**Chemical Engineering and Bioengineering**
**Washington State University**

## The Role of Liquid-phase Catalysis in Production of Renewable fuels and Chemicals

### October 25, 2017 at 3:30 pm
### McMillan Auditorium (136 Ross Hall)

The market demand for renewable fuels and chemicals has surged worldwide in the past decades. However, today the cost of liquid hydrocarbon fuels from biomass is still too high to compete with petroleum derived transportation fuels. One of the grand challenges in biofuels production is the low carbon atom efficiency to the fuel products. Herein our group has developed a novel "one-pot" biphasic tandem catalytic process (biTCP) in which terpenoids or lipids were converted into hydrocarbons at an extraordinarily high carbon efficiency. For demonstration, the mono- and diterpenoids, e.g., the biocrudes of eucalyptus and grindelia, were efficiently converted into cycloalkanes, a high-density jet fuel component. This biTCP process was also able to efficiently convert fatty acids and triglycerides extracted from oilseed crops to renewable diesel. Moreover, to improve the biorefinery economics, we have also been exploring conversion technologies for producing value-added chemicals. In this regard, we developed various liquid-phase catalytic processes for synthesizing a variety of chemicals from cellulosic biomass. In particular, we demonstrated that the oxidative function and the Lewis acidic property of the ZrO2 and Zr-SBA15 materials in the liquid-phase solvents were attributed to the high-yield production of levulinic acid and ethyl lactate, respectively, from cellulose. Overall, the role of liquid-phase catalysis was investigated to gain a fundamental understanding of the effects of catalyst properties and process conditions on the conversion of various biomass feedstocks to renewable fuels and chemicals.

**DR. HONGFEI LIN** received his B.E and M.S. degrees in Chemical Engineering from Tsinghua University, China, and his Ph.D. degree in Chemical Engineering from Louisiana State University. He was a postdoctoral fellow at the University of California, Santa Barbara and then worked in renewable energy industry for three years. He joined the Department of Chemical and Materials Engineering at the University of Nevada, Reno as an Assistant Professor in 2010 and was promoted to Associate Professor in 2016. He then transferred to Washington State University in the same year. Dr. Lin's current research focuses on catalysis and sustainability, with the emphasis on developing liquid-phase catalytic processes coupled with multifunctional material systems for production of fuels and chemicals from renewable feedstocks. He has authored ~40 scientific papers in journals including Energy and Environmental Science, Green Chemistry, ChemSusChem, etc. He is the international advisory board member of Energy Technology. He also served as the guest editor for Catalysis Today and Energy Technology. He is an active member of American Chemical Society (ACS) and American Institute of Chemical Engineers (AIChE) and has regularly organized symposia and conference sessions.

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