



Phillip E. Savage

Walter L. Robb Family Chair
Chemical Engineering
Penn State University



Phillip E. Savage is the Head of the Chemical Engineering Department at Penn State and the Walter L. Robb Family Chair. Phil is also Editor-in-Chief of I&EC Research.

Phil has published over 200 research articles and given over 100 invited lectures. His research deals with kinetics, pathways, and mechanisms for chemical reactions in hot, compressed water, and his recent work focuses on hydrothermal conversion of biomass to fuels and chemicals. He received the 2015 Energy & Fuels Excellence in Publication Award from ACS and the 2014 Research Excellence Award from the AIChE Sustainable Engineering Forum. He is a Fellow of both the AIChE and ACS.

Toward liquid fuels from wet biomass via hydrothermal processing

Abstract

Microalgae and other renewable biomass resources can be feedstocks for producing crude bio-oils that could be further processed in existing petroleum refineries, either alone or in blends with petroleum crude oils. This approach, which would use the existing global infrastructure for petroleum refining and for distribution and end-use of refined products, could facilitate the eventual transition to reliance solely on renewable liquid fuels. Hydrothermal treatment (reactions in water at elevated temperature and pressure) is the preferred route for converting wet biomass (e.g., algae, sludge, food waste) to a crude bio-oil as it works quickly (tens of seconds) and avoids the energy-intensive step of biomass drying. This seminar will outline this hydrothermal liquefaction approach and recent progress made in understanding the hydrothermal conversion of wet biomass (~ 350 °C) to biocrude. Biomass feedstocks that will be discussed include microalgae and its biochemical constituents (e.g., model proteins, model peptides, and model polysaccharides). We will outline new insights into the reaction pathways and kinetics arising from reaction modelling work and model compound experiments. We will also highlight studies into the fate of metals in biomass and their distribution amongst the reaction products. Finally, the talk will consider sustainability aspects by focusing on how a process could recover the N and P atoms in the biomass so that they might be recycled as fertilizer to grow more biomass, for either energy production or for food.

Thursday Nov. 29th, 2018
368 Ritchie Hall | 11:00 – 11:50AM