

## Solvent Liquefaction

The pilot-scale solvent liquefaction system (1 kilogram per hour capacity) was an Iowa State University partnership with Chevron Technology Ventures (CTV) that demonstrated solvent liquefaction as a pathway to produce low cost drop-in transportation fuels. The solvent liquefaction system mixed a proprietary solvent with woody or herbaceous biomass which was extruded into a reactor and split into an upper stream that handled gases and vapors and a lower stream that handled liquids and small amounts of solids. Each stream had a series of filters and separators that recovered products that included bio-oil, small amounts of biochar and solvent for recycling. CTV hydroprocessed the bio-oil into refinery compatible biocrude and fuel blendstocks. The pilot plant test results were used to conduct a techno-economic analysis and develop a demonstration plant design. This work was done because continuous pilot-scale production and recovery of these materials is critical to demonstrate the commercial viability of solvent liquefaction for the production of drop-in hydrocarbon transportation fuels.

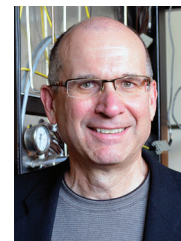
### Accomplishments

- » Formed partnership that brought the CTV solvent liquefaction pilot plant (\$1.4 million) to Iowa State University.
- » Acquired a four-year, \$3.5 million grant from the U.S. Department of Energy Biomass Research and Development Initiative.
- » Achieved >65 percent oil yield in single-pass mode without the use of reducing gas or catalysts.
- » Bio-oil product produced with oxygen content of  $\leq 10$  percent.  $\leq 1$  percent when hydroprocessed.

### Future Work

- » Continue commercialization of the solvent liquefaction process.
- » Work with new feedstocks, such as lignin, and solvents to create fuel and chemical intermediates.

## Team Members



**Robert C. Brown**  
Distinguished Professor  
Mechanical Engineering  
  
(515) 294-7934  
[rcbrown3@iastate.edu](mailto:rcbrown3@iastate.edu)

**Lysle Whitmer**  
Bioeconomy Institute

**Andrew Friend**  
Bioeconomy Institute

**Jordan Funkhouser**  
Bioeconomy Institute

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515 294-7612, Hotline 515-294-1222, email [eooffice@iastate.edu](mailto:eooffice@iastate.edu)