Autothermal Pyrolysis

The latest breakthrough in thermal deconstruction of biomass to biofuels and biochemicals at the ISU Bioeconomy Institute is an intensified process called autothermal pyrolysis.

**Autothermal pyrolysis** provides the energy for pyrolysis through partial oxidation of pyrolysis products within the reactor, thereby eliminating the heat transfer bottleneck of conventional pyrolysis.

**Simpler Process, Higher Yields**

Autothermal pyrolysis has four advantages:

- Simplified reactor design, removing the need for heat transfer equipment.
- Process intensification, increasing outputs of desired products with fewer inputs.
- Use of air as fluidization agent in place of nitrogen or other inert gases.
- Reduced capital costs of more than 25%.

The bio-oil is recovered in fractions, a patented BEI technology, to produce:

- Sugars, which can be fermented to alcohol.
- Phenolic oils, to produce bio-asphalt and diesel fuel substitutes.
- Aqueous phase, burned to dry biomass feedstock.

Pyrolysis also produces biochar, a soil amendment and carbon sequestration agent.

**Proving it on a Commercial Scale**

BEI is working to prove the technology works on a commercial scale, an effort being accelerated by the DOE-funded RAPID Institute, the country’s tenth Manufacturing USA initiative. BEI has teamed with Stine Seed Farms, the nation’s largest independent seed company, and Frontline Bioenergy, LLC, on the project.

Autothermal pyrolysis is central to BEI’s “py refinery,” a modular system to produce biofuels and biochemicals.