FastHydropyrolysis for Hydrogen Bio-Oil

The transportation sector currently relies almost exclusively on liquid hydrocarbons as its energy source for good reasons. One of many reasons is that the high energy density of gasoline far exceeds that of proposed replacements like hydrogen or batteries. Additionally, the liquid hydrocarbon fuel distribution infrastructure is efficient and already in place. Production of liquid fuels from biomass can solve the problem of CO2 emission from the transportation sector because CO2 released from vehicle exhaust is captured during biomass growth.

Researchers from Purdue University have invented a process of “fast” pyrolysis, which is to be used on biomass. The process feeds H2 from a carbon-free source to a fluidized bed reactor. The H2 is mixed with a biomass in the reactor. The resulting mixture produces a biomass containing less oxygen atoms than normal due to the addition of the hydrogen. The mixture is then sent to a separator to remove the char, which is burned to create heat for the system, from the “bio-oil.” The bio-oil is further processed to create the hydrocarbon, which is then cooled to create the liquid hydrocarbon. The H2Bioil has all of the advantages of conventional Bio-Oil in addition to a greatly increased energy density all-the-while retaining compatibility with the conventional hydrocarbon fuel distribution, a truly carbon neutral solution to the Green transportation fuels concern.

Domain:
- Energy

Advantages:
- Dramatically lower fuel cost
- Increased bio-oil energy density

Dr. Rakesh Agrawal is a Winthrop E. Stone Distinguished Professor of Chemical Engineering at Purdue University. His research interests include energy transformation and use issues for solar, coal, biomass and hydrogen economy; novel separation processes using distillation, membranes and adsorption;