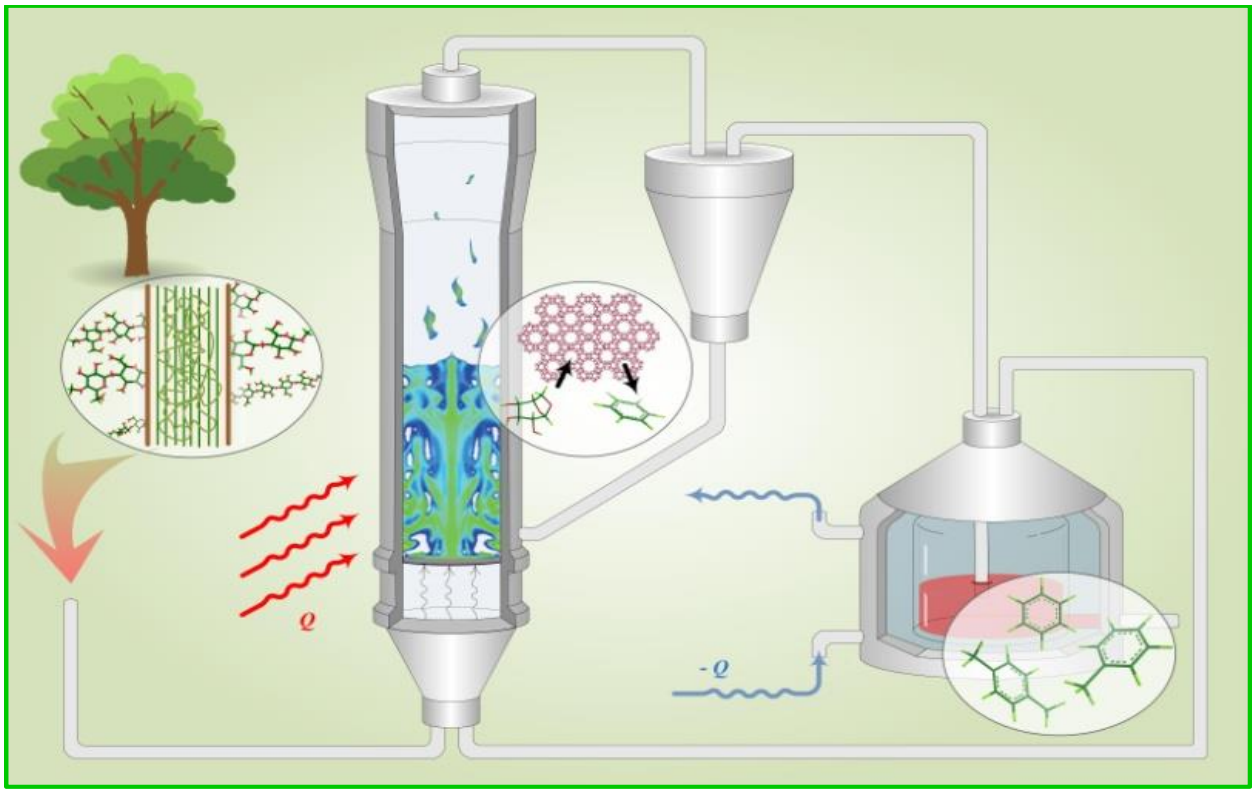
Pumping up the Biofuel Yield

Researchers combine an advanced catalyst with a next-generation biofuel process to significantly improve the yield of biofuels

Reaction engineers from the Catalysis Center for Energy Innovation at the University of Massachusetts have invented a catalytic process that significantly improves the yield of biofuel from biomass. The research team led by Professors Wei Fan and George Huber can take wood or other biomass sources and feed them directly into their process, Catalytic Fast Pyrolysis (CFP). Within the reactor, particles of biomass are rapidly heated within seconds to 900 °F, and the wood breaks down to small molecules which evaporate. In the second step within the reactor, the volatile molecules are catalytically reacted to produce higher value products such as benzene, toluene, and xylenes (key components of fuels such as gasoline). The team has discovered that the introduction of a gallium-zeolite (Ga/ZSM-5) significantly increases the yield of aromatics and reduces the amount of wasted biomass which is converted to char. Using this catalyst, the overall aromatics yield increases to 23%, which is a 40% improvement over the use of previous catalysts within CFP. This advance can get closer to the goal of catalytic fast pyrolysis being economically viable. This process is rapidly moving from the research laboratory and into the development stage. The team's catalytic fast pyrolysis technology has already been licensed to Anellotech, Inc. Development of a full-scale CFP process could contribute to a petrochemicals industry valued at an estimated $400 billion annually.



Schematic of catalytic fast pyrolysis.

Relevant Publication: Y. Cheng, J. Jae, J. Shi, W. Fan, G.W. Huber, "Production of renewable aromatic compounds by catalytic fast pyrolysis of lignocellulosic biomass with bifunctional Ga/ZSM-5 catalysts," Angew. Chem. Int. Ed., **2012**, 124, 1416-1419. DOI: 10.1002/ange.201107390