

# 11<sup>th</sup> World Bioenergy Congress and Expo

July 02-04, 2018 | Berlin, Germany

## Carboxylate platform: Chemicals and fuels from biomass

**Mark T. Holtzapple**

Texas A&M University, USA

In an anaerobic environment, mixed cultures of soil microorganisms hydrolyze biomass components (e.g., cellulose, hemicellulose, starch, pectin, protein) into monomers, which are subsequently fermented into short-chain carboxylate salts (e.g., acetate, propionate, and butyrate). Normally, methanogens convert these products to biogas (methane, carbon dioxide); however, by adding a methanogen inhibitor, the fermentation becomes “stuck” and the carboxylates accumulate. In this stuck fermentation, the short-chain carboxylates (C2, C3, C4) can elongate to medium-chain carboxylates (C5, C6, C7, C8). The carboxylates are recovered from the fermentation broth and become building blocks for the carboxylate platform. Using well-established chemistry, the carboxylates can be converted to a wide variety of chemicals (carboxylic acids, primary alcohols, secondary alcohols, ketones, aldehydes, esters, ethers, olefins, paraffins, cyclics, aromatics) and fuels (gasoline, jet fuel, diesel). Because the carboxylate platform does not require sterile operating conditions nor the addition of extraneous enzymes, processing costs are very modest. For example, from energy crops (\$60/tonne), the selling price of gasoline and jet fuel is estimated to be \$1.76 to \$2.56/gal, depending on scale. Using wastes (e.g., municipal solid waste, sewage sludge, manure) as feedstock, the selling price of gasoline and jet fuel is estimated to be \$1.25/gal.

m-holtzapple@tamu.edu