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Session 3

Bioprocessing – Including Separations

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The bioprocessing session of the 26th Symposium attracted a large number of submissions, with over 70 oral and poster presentations. This magnitude of work reflected a tremendous variety in approaches and issues being addressed for the processing of biomass and related separations work.

Feedstocks of all kinds are being investigated, with many studies looking at large volume agricultural sources such as corn stover and bagasse and others targeting specific waste streams, such cheese whey, cull potatoes or dairy manure. Active research is also being carried out on various forms of bioremediation of toxic wastes, both organic and inorganic. Most studies using cellulosic resources pretreated the feedstock, with common methods appearing to be dilute acid hydrolysis, steam explosion and alkaline treatments. Utilization of gas phase substrates is also being widely studied in various contexts.

Products being investigated offered even more variety that the feedstocks utilized. Ethanol remains the dominant focus of wide attention, however there appears to be increasing interest in other commodity scale products such as organic acids, longer chain alcohols and xylitol. Organic acids to be used as chemical feedstocks for further conversions are apparently gaining prominence. More specialized bioproducts such as surfactin, biocides or microbial polysaccharides are also receiving attention.

Processing and separations technologies also indicate a tremendous amount of creative energy being applied to the issues of bioprocessing. Extractive and separatory fermentation systems received much attention, with many techniques investigated, including two-phase fermentations, membrane extraction methods, ion exchange, dialysis and foam fractionation. Extraction processes were largely motivated by the need for either inexpensive product purification or for reducing the inhibitory products resulting from pretreatment and fermentation. Indeed, several studies were concerned specifically with reducing the inhibition resulting from biomass pretreatment processes. Immobilization was a common practice for both cells and enzymes. Lastly, modeling appears to be a common and

effective tool for analysis of bioconversions. Models of many kinds were developed, including structured, kinetic, hybrid-neural and ASPEN-Plus, and were reported to give verifiable results.

The variety of feedstocks, products and conversion processes under development speak to the tremendous growth and potential for the production of fuels and chemicals from biomass resources.