

Introduction to Session 1

Thermal, Chemical, and Biological Processing

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The major theme of this session is thermal, chemical, and biological processing of biomass for production of fuels and chemicals. In this year's program, the coverage has been extended to include product recovery and downstream processes. The mainline topics are pretreatment, acid hydrolysis, and pyrolysis of biomass. Papers in this session touch on various aspects of these topics, with emphasis placed on the pretreatment area.

Pretreatment of biomass is perhaps one of the least understood subjects in biomass conversion technology in terms of its role, methodology, application, and mechanisms. The primary objective of pretreatment is to enhance the susceptibility of the cellulosic substrate to the action of cellulase enzyme. The methodology to achieve this goal varies widely depending on specific application: treatments with various types of acids, alkaline treatments, steam treatment, and simple mechanical treatment. The net effect of the pretreatment also varies widely in terms of its physical and chemical characteristics. A substantial portion of the hemicellulose sugar can be hydrolyzed during pretreatment. The degree of hemicellulose and lignin removal can be important factors determining the overall effectiveness of the pretreatment. The physical interaction of enzyme and the pretreated substrate involve transport and adsorption phenomena, and it may also play an important role in the enzyme action. A number of papers in this session provide indepth discussion regarding new developments in these topics. Specific subjects include development of novel pretreatment methods, characterization and understanding of pretreatment mechanisms, enzyme adsorption on pretreated substrate, significance of deacetylation in pretreatment, and refinement of conventional acid pretreatment.

Several papers deal with the acid hydrolysis process. The pilot plant test on acid hydrolysis of municipal solid wastes, and characterization of its effluents and environmental consideration are the main features of the recent developments in this area.

Two important papers that provide novel ideas and new experimental findings in the area of downstream processing, product recovery and extractant regeneration, and optimization of large-scale chromatography are included. As usual, significant input to this session comes from overseas, introducing new and innovative concepts conforming to the theme of this session.