

SESSION 4

Process Economics and Commercialization

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Biomass, as a sustainable resource, has always attracted attention as a feedstock for manufacture of fuels and chemicals. Biomass feedstocks were, indeed, at one time the source of many industrial chemicals. Today, most specialty and commodity chemicals are manufactured from fossil-derived hydrocarbons. Through the major and rapid advances in biotechnology, interest was again generated in conversion of waste biomass resources into fuels and chemicals. Biotechnology was perceived as capable of doing all things for all purposes. Certainly the impacts of biotechnology on health care (particularly pharmaceuticals) have been dramatic, with breakthroughs being announced almost daily. We read also of changes engineered into plant genes for disease resistance, drought resistance, larger yields, and better product quality. In the chemicals from the biomass arena, we have not seen such dramatic breakthroughs, although an abundance of research and development activity is ongoing. During the 17-year time frame of the symposium, great strides have been made in elucidating the biological pathways by which organisms convert various substrates to desirable products and in manipulating the organism gene structures to increase yields from enzymes. Progress has also been made in pretreatment of the biomass to enhance its reactivity and to better utilize a larger fraction of the biomass constituents. However, very little of this research and development work has led to commercialization of processes for manufacture of biomass-derived products.

Economics is one of the main factors inhibiting the development of the chemicals-from-biomass industry. Significant research and development costs are associated with the commercialization of fuels and chemicals derived from biomass materials using biotechnology-based routes. Economic risks are high and profit margins appear to be low. Many of the biomass-derived products are competing with products derived from other raw materials that require less pretreatment and whose manufacturing processes have attained economies of scale. These have brought manufacturing costs down to levels that, at the present time, have not been obtained with biomass feedstocks and biotechnology-based processes.

Ethanol derived from biomass continues to foster great interest. Several of the papers in this session address economic and technical hurdles to this potential industry and identify key leverage areas that need to be addressed in order to hasten commercialization. Other potential biomass-derived products have not attracted as much research and development investment as the biomass ethanol arena. However, some commercial processes have developed. During this session, the approaches used and the major commitments made to these projects, which helped bring them to commercialization, will be discussed.