# Introduction to Session 2

## Applied Biological Research

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This session reports advances in biological research that is directed toward improving microorganisms or their enzymes for transformation of substrates into fuels or chemicals. The first portion of this session was concerned with improved biocatalysts for processing various substrates. In the first paper, *Streptomyces viridosporus* was found to produce aromatic aldehyde oxidase extracellularly, and the probable involvement of this enzyme in lignin biotransformation was postulated. In another study, a continuous two-phase reactor system was used to achieve higher vanillin concentrations without inhibiting bioconversion, and the effect of key parameters on performance of the process was reported. Two plate assays that can be used with agar growth media were explored in the next presentation as methods to detect bacteria that degrade sulfur containing compounds in fossil fuels, one being based on fluorescence and the other on an oxidation-reduction indicator dye.

The presentations in the second portion of the session were directed toward conversion of renewable resources into fuels. The fermentation of xylose to ethanol by yeast would significantly improve the yields of ethanol from biomass, and a one-step gene disruption was reported in this session for isolation of a xylulokinase mutant of *Saccharomyces cerevisiae.* In the next presentation, the state of the art of the genetics and biochemistry of the *Trichoderma* cellulase system was reviewed, and four sets of modified enzymes were constructed based on site directed mutagenesis. The physical and enzymatic properties of the native and modified forms of one of those components, rCBHII, were then presented. In another study of cellulases, the ratio of the cellobiohydrolase to endoglucanase components was found to be unimportant if both saturated the substrate, but at lower concentrations, synergism was observed. Finally, microbial population development of key groups of bacteria involved in methane production in sanitary landfills was measured from initial incubation through the onset of methane production, and differences were noted between enhanced and inhibited systems for methane production.