

Introduction to Session 4

Bioengineering Research

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Applications of biotechnology are exceedingly diverse, with products and processes spanning 10 orders of magnitude or more in terms of unit value (e.g., \$/g) and demand volume (e.g., kg/y). This symposium series has traditionally emphasized products having relatively low unit value and high demand volume, such as commodity chemicals, waste treatment, and specialty chemicals. For such products, costs for raw material and biological conversion are usually more significant than for high value products such as pharmaceuticals. Because of the importance of biological conversion and the small cost margins associated with high-volume/low-value products, biochemical engineering research and bioprocess engineering are critical for the development of practical processes. Important elements include research that strengthens the information base in relevant areas, well-targeted innovation-oriented research, and process engineering and design that is both innovative and realistic. The challenge is to draw on these elements in order to generate processes that are cost-effective by virtue of being fast, high-yielding, simple, robust, based on inexpensive raw materials, and positive, or at least neutral, with respect to environmental impact.

The papers composing the bioprocessing research session address a cross section of topics at the cutting edge of biochemical engineering research and bioprocess engineering. These topics include multiphase systems involving either immobilized biocatalysts and/or solid-phase substrates, description and alleviation of product inhibition, analysis of transport phenomena and reaction kinetics in bioreactors, and downstream processing.