TECHNOLOGY TRANSFER
AND ECONOMIC DEVELOPMENT
Putting Science to Work

BIOPROCESSING RESEARCH USER FACILITY

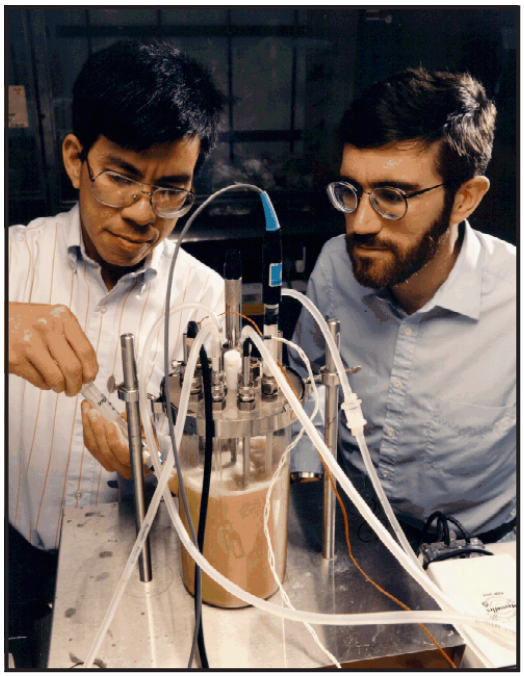
The Bioprocessing Research Facility (BRF) includes laboratories for the investigation of advanced bioprocessing concepts using stirred-tank and columnar bioreactors and a fermentation pilot plant for large-scale batch and columnar experiments. Other research and support laboratories are available on site.

RESEARCH OPPORTUNITIES

The BRF provides the user with state-of-the-art equipment, including stirred-tank and advanced columnar bioreactors ranging in size from bench scale to 500 L. Several instrumented stirred-tank fermentors, ranging from 1 to 500 liters, can be used for large-scale demonstrations, process scale-up studies, or production of gram to kilogram quantities of microorganisms or biochemicals under controlled conditions. Computer control and data acquisition are configured into the fermentors. Aerobic or anaerobic operation is possible with a variety of gases. Photobioreactors are also available.

The BRF's large fermentors have been approved for use with nonhazardous recombinant microorganisms. The columnar bioreactors can be operated as fixed-bed or fluidized-bed bioreactors and are equipped to accommodate a variety of process monitoring techniques and control equipment. They can also be used as columnar biofiltration systems for bioremediation applications. The facility also has apparatus for the production of small, uniform, immobilized biocatalysts. Large equipment available for product separation and recovery includes continuous centrifuges, homogenizers, and a cross-flow filtration unit.

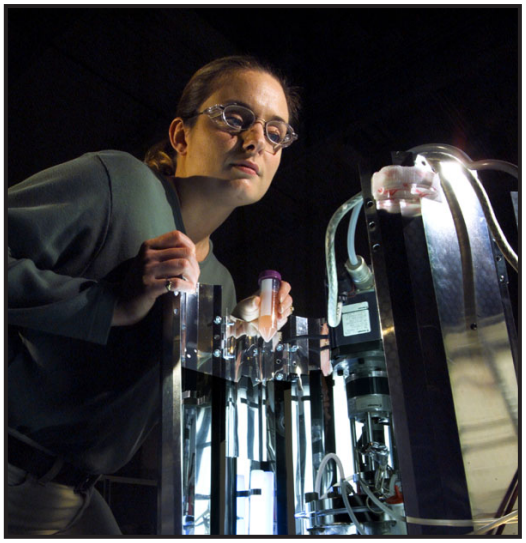
Users of the facility have access to several types of analytical equipment such as gas chromatographs, spectrophotometers, high-pressure liquid chromatographs, and protein purification systems. A cold room, environmentally controlled growth chambers, anaerobic hoods, autoclaves, sterile culture–transfer areas, refrigerators and freezers, freeze dryers, microscopes, a hammer mill, and other laboratory equipment are available, as are computer facilities. Among the BRF's supporting facilities are machine, instrument, and glass shops; several electron microscopes; library and information services; computer graphics; state-of-the-art analytical chemistry services; small-angle neutron and X-ray scattering reactors, accelerators, and solid-state physics facilities.



Staff scientists collecting samples from a bioreactor that produces succinic acid.

Research and development activities include feedstock pretreatment and fractionation, microbial culture selection and improvement, genetic manipulation, microbial and enzyme immobilization, advanced bioreactor concepts, biotreatment of wastes, process feasibility and scale-up, advanced analytical concepts, bioprocessing monitoring and control, and biochemical separations.

A 500-L computer-controlled fermentor for large-scale production of microorganisms.



A student intern performs a photosynthetic fermentation for the DOE Genomes to Life (GTL) Program.

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