
Platforms for Rapid Screening and Analysis of Biological and Chemical Processes

Personnel

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Sponsorship

DuPont MIT Alliance

This is a multidisciplinary research program aimed at developing new platforms for bioprocess discovery and development, specifically banks of miniaturized, automated fermentors, each with integrated bioanalytical devices, and all operating in parallel (see Figure 48). Such systems will address the continuing demand in bioprocess science and engineering for fast and accurate analytical information that can be used to rapidly evaluate the interactions between biological systems and bioprocess operations. Moreover, the microfermentors will provide the platforms for efficiently incorporating modern tools of biology (genetics, enzymology, bioinformatics) to improve bioprocess screening and development. Applying microfabrication technology to bioprocess development will result in rapid screening of strains and metabolic pathways with dramatic productivity increases analogous to those experienced in drug discovery. In order to realize the microfermentors, we are addressing the following critical issues: (i) design and fabrication strategies for microfermentors; (ii) integration of novel optical sensors; (iii) sensitivity of the analytical devices; (iv) biocompatibility of the materials; (v) appropriate biological systems for evaluating performance of the microfermentors; and (vi) benchmarking of microfermentation against traditional bioprocessing methodologies.

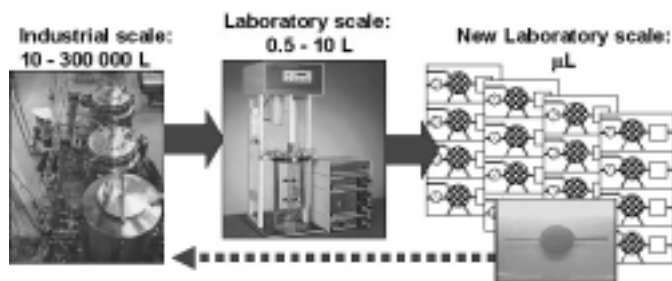


Fig. 48: Schematic illustrating the use of parallel microfabricated fermentors for bio-process discovery and development