

**STUDY OF MORPHOLOGY AND PROCESS PARAMETERS DURING THE
Trichoderma reesei Fermentation**

N. Patel*, T. White**, G. Munkvold** and J. Thibault*

*Dept. of Chemical Engineering, University of Ottawa, Ottawa, ON, K1N 6N5 Canada

Email: thibault@genie.uottawa.ca

**Iogen Corporation, Ottawa, ON, K2E 7S6 Canada

ABSTRACT

This research project is aimed at improving the performance of bioreactors for the production of enzymes by the filamentous fungus *Trichoderma reesei*. In particular, it is desired to understand the intimate relationship that exists between the shear field within a bioreactor, the morphology of the microorganism, and the process performance. To achieve this objective, a series of fermentation runs are performed in four different bioreactors (industrial and laboratory-scale stirred tank bioreactors, reciprocating plate bioreactor and Couette flow bioreactor), each having a significantly different shear field to which microorganisms are exposed. A Couette flow bioreactor, where the shear field is uniform is built specifically for this investigation. Fermentations are performed using the industrial protocol: in batch mode for the growth phase with glucose as a substrate followed by a production phase of 5-7 days in fed-batch with lactose as an inducing substrate. The pH, temperature and dissolved oxygen are measured on-line. Few batch and chemostat fermentations are also performed to obtain data over a wider operating range.

Samples are periodically withdrawn from the bioreactors to perform a series of tests: biomass, substrate and enzyme concentrations, enzyme activity, and light microscopic image analysis for a morphological study to have a more profound understanding of the morphology of the microorganism. To complement this information, modelling of the process will be performed in view of process integration and improvement. This presentation will discuss preliminary results of the investigation.