

Distinguished Researcher

Project Title

**Bioreactor Design Biotechnology
Applications: Engineering
principles and process
innovations**

University: University of Waterloo



Researcher:
Prof Murray Moo-Young
Nationality: Canadian

Abstract

Murray Moo-Young is a distinguished professor emeritus of Chemical Engineering and director of the Canadian Cell-Factory Bioprocessing Research Network at the University of Waterloo. Jamaican-born of Chinese heritage, he was educated at the universities of London (BSc, PhD) Toronto (MSc) and Edinburgh (post doctorate). To date, his work has produced 13 books, nine patents and over 300 papers. For his professional achievements, Murray has received many awards including the Medal of the Association of Professional Engineers Ontario; the premier award of the Canadian Society for Chemical Engineering; and the premier award of the American Chemical Society, Biochemical Technology Division. He is a fellow of the Royal Society of Canada, "the highest accolade for an academic in Canada".

Bioreactors are recognized to play a dominant role in a wide range of biotechnology applications. In this research project, engineering design principles are developed and implemented for applications in biomanufacturing and bioremediation strategies in the production of biological products, especially from recalcitrant organic contaminants. The bioreactor systems involved are microbial fermentation and animal-cell cultures. Mechanically-stirred tanks, air-lift devices and packed-beds are the geometric configurations considered. Quantitative design correlations based on physical transport phenomena and biological kinetics are formulated and applied to several biotechnological scenarios. Generic methodologies for minimizing or eliminating operational constraints are addressed. In particular, problems caused by cell host genetic instabilities, deleterious protease co-production, and shear sensitivity of non-Newtonian materials are investigated. Unifying principles are elucidated that offer new insights into a range of diverse bioprocess strategies for innovative practical uses.