

Development and Characterisation of a Microbioreactor 'Cassette' for Cell Culture Applications

Authors : Nelson Barrientos, Matthew J. Davies, Marco C. Marques, Darren N. Nesbeth, Gary J. Lye, Nicolas Szita

Abstract : Microbioreactor technology is making important advances towards its application in cell culture and bioprocess development. In particular, the technology promises flexible and controllable devices capable to perform parallelised experimentation at low cost. Currently, state of the art methods (e.g. optical sensors) allow the accurate monitoring of the microbioreactor operation. In addition, the laminar flow regime encountered in these devices allows more predictive fluid dynamics modelling, improving the control over the soluble, physical and mechanical environment of the cells. This work describes the development and characterisation of a novel microbioreactor cassette system (microbioreactor volume is 150 μ L. The volumetric oxygen transfer coefficient (KLa) and mixing time have been characterised to be between 25 to 113 h⁻¹ and 0.5 and 0.1 s, respectively. In addition, the Residence time distribution (RTD) analysis confirms that the reactor operates at well mixed conditions. Finally, *Staphylococcus carnosus* TM300 growth is demonstrated via batch culture experiments. Future work consists in expanding the optics of the microbioreactor design to include the monitoring of variables such as fluorescent protein expression, among others.

Keywords : microbioreactor, cell-culture, fermentation, microfluidics

Conference Title : ICBBE 2016 : International Conference on Biological and Bioprocess Engineering

Conference Location : Miami, United States

Conference Dates : March 24-25, 2016