Bioprocessing Technology Institute
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Droplet-based micro and nanofluidic system for single-enzyme analysis

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Level 6, Centros

Hosted by Dr Shireen Goh

Seminar Abstract

Recently, many researchers have investigated the behavior of biomolecules on the single-molecular level to unravel phenomena which remain hidden in conventional bulk experiments. In our approach, a micro and nanofluidic device was used to provide femtoliter compartmented aqueous droplets for encapsulation of single enzymes and the demonstration of their activity. The kinetic activity of individual enzyme molecules was determined in aqueous droplets generated in a micro and nanofluidic device. To avoid high background noise, the enzyme and substrate solution was confined into femtoliter carriers, achieving high product concentrations from single-molecule encapsulation. The tiny droplets ($\Phi \sim 2.5\mu m$) generated from this fluidic system were highly monodisperse, beneficial for an analysis of single enzyme activity. The method presented here allows to follow large numbers of individual droplets over time.

About the Speaker

Rerngchai Arayanarakool received his Bachelor's degree in Chemical engineering from Chulalongkorn University, Thailand and Master's degree from École Normale Supérieure (ENS) Cachan, France. He graduated PhD in Micro and nanofluidic technology from University of Twente, The Netherlands. His PhD research focused on droplet-based micro and nanofluidic based devices for single-enzyme analysis. After PhD graduation, he worked at Leibniz Institute for Solid State and Materials Research (IFW) Dresden, Germany where he focused on fabrication of 3D micro-architectures for tissue engineering and biosensing devices. Then, he joined Mechanical Engineering at NUS to develop the microfluidic device for heat transfer application.