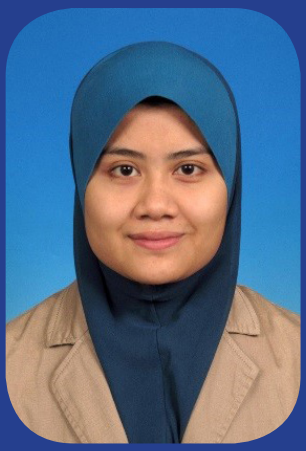
ABD RAZAK NURUL NADIAH

nurulnadiahabdrazak@gmail.com



Doctoral School: MEGeP
First year registration: 2018
Funding: Campus France & Sunway University

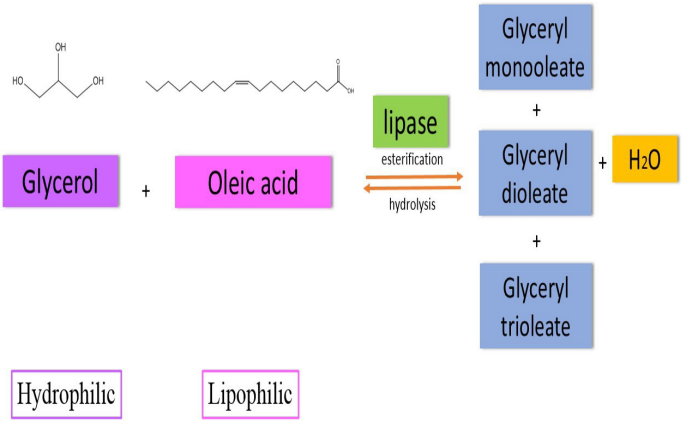
Supervisors: Patrick COGNET, Yolande PÉRÈS

CONVERSION OF GLYCEROL TO VALUE-ADDED PRODUCTS THROUGH BIOCATALYSIS REACTION USING MICROREACTOR

Conversion du glycérol en produits à haute valeur ajoutée par réaction de biocatalyse à l'aide d'un microréacteur

In the last few decades, it has been observed that a significant amount of glycerol produced during the biofuels production has directed to the exploration of the valorization of this by-product. This by-product can be converted to different value-added derivatives such as propylene glycerol, succinic acid, lactic acid, polyglycerols, glycerol carbonates and acrolein. Enzymes are organic catalysts used for the production of useful substances in an environmentally friendly way. They are considered as versatile enzymes for they can be used in various reactions such as hydrolysis, esterification and biotransformation. Microreactors have received a great deal of attention and they are promising technology in a broad range of areas including chemistry, biochemistry, chemical engineering and biotechnology. Although microreactors are thousands of times smaller than their traditional batch counterparts, they have been proved to have fundamental benefits. The high surface-to-volume ratio as their main characteristic can result in effective heat exchange, rapid mass transfer and minimal use of reagent and solvent.

In this work, the kinetic and production aspects of lipase-catalysed esterification of glycerol with oleic acid using macro- and microscale systems are being studied. It is of great interest to verify whether the apparent values of kinetic parameters for a specific reaction catalyzed by enzyme are somehow altered by the geometry, scale and close proximity between the enzyme and its substrate afforded by the constricted milieu of a microreactor. The information is important both in fundamental understanding of enzyme catalysis behaviour and its application, optimization and process implementation for biotechnological enzyme-mediated conversion using specific reactor configuration.



Schematic representation of the lipase-catalyzed esterification of glycerol with oleic acid.