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# *Immobilization of Candida Antarctica lipase B in a Silicified Hydrogel Support and its Application as Bioreactor*

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***Abstract***

Supramolecular hydrogels have attracted increasing interest in recent years because of their ability to incorporate high levels of proteins, cells, antibodies, peptides and genes [1-2]. In this work, we propose a new approach to confinement of Candida Antarctica lipase B (CALB) within a supramolecular silicified hydrogel based on Pluronic F127 and α-cyclodextrin (α-CD) [3]. After functionalization of the matrix, the catalytic performance of the supported biocatalyst was evaluated in the oxidation of 2,5-diformylfuran (DFF) to 2,5-furandicarboxylic acid (FDCA), a fully biosourced alternative to terephthalic acid used in the production of polyethylene terephthalate (PET) [4]. Our results revealed that while CALB immobilized in conventional sol-gel silica yielded exclusively 5-formylfuran-2-carboxylic acid (FFCA), confinement of the enzyme in the silicified hydrogel imparted a 5-fold increase in DFF conversion and afforded 67% FDCA yield in 7 h and almost quantitative yields in less than 24 h. The hierarchically interconnected pore structure of the host matrix was found to provide a readily accessible diffusion path for reactants and products, while its flexible hydrophilic-hydrophobic interface was extremely beneficial for the interfacial activation of the immobilized lipase.

***Biography:***

Rudina Bleta has completed her PhD from Nancy University and postdoctoral studies from University Paul Sabatier at the CIRIMAT-Carnot Institute in Toulouse. In 2012, she joined the Professor Monflier's team at the UCCS-Artois as a lecturer. Her research expertise consists in developing new synthesis approaches, especially from soft chemistry routes, to design novel nanostructured porous materials, with a specific focus on the development of heterogeneous catalysts for environmental and sustainable energy applications. .

***Speaker Publications:***

1. C. Decarpigny, R. Bleta, A. Ponchel, E. Monflier, Confinement of Candida Antarctica Lipase B in a Multifunctional Cyclodextrin-Derived Silicified Hydrogel and its Application as Enzymatic Nanoreactor. ACS Applied Bio Materials 2019, 2(12), 5568-5581 - doi: 10.1021/acsabm.9b00646

2. R. Bleta, A. Ponchel and E. Monflier, Cyclodextrin-based supramolecular assemblies: a versatile toolbox for the preparation of functional porous materials. Environmental Chemistry Letters 2018, 16(4), 1393-1413 - doi : 10.1007/s10311-018-0768-x

3. R. Bleta, B. Schiavo, N. Corsaro, P. Costa, A. Giaconia, L. Interrante, E. Monflier, G. Pipitone, A. Ponchel, S. Sau, O. Scialdone, S. Tilloy, A. Galia, Robust Mesoporous CoMo/γ-Al2O3 Catalysts from Cyclodextrin-Based Supramolecular Assemblies for Hydrothermal Processing of Microalgae: Effect of the Preparation Method. ACS Appl. Mater. Interfaces 2018, 10(15), 12562-12579 - doi: 10.1021/acsami.7b16185 Voir aussi

4. A.Lannoy, R. Bleta, C. Machut-Binkowski, A. Addad, E. Monflier, A. Ponchel, Cyclodextrin-directed synthesis of gold-modified TiO2 materials and evaluation of their photocatalytic activity in the removal of a pesticide from water. Effect of porosity and particle size. ACS Sustainable Chem. Eng. 2017, 5, 3623-3630 - doi: 10.1021/acssuschemeng.6b03059

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