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Abstract

Lipase Enzyme for Biomass Valorization †

Madalina Tudorache

Faculty of Chemistry, University of Bucharest, 4–12 Regina Elisabeta Av., 030018 Bucharest, Romania; madalina.sandulescu@g.unibuc.ro

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Lipase enzymes are part of the hydrolases family acting on carboxylic ester bonds. Physiologically, the lipase catalyzed the hydrolysis of triglyceride, leading to di-/mono-glycerides, fatty acids and glycerol. Additionally, lipases can assist the inter-/trans-esterification reactions in nonaqueous media [1–10]. This versatile behavior makes lipases one of the most useful enzymes in industrial areas. The most significant applications of lipases have been mainly developed in the food, detergent and pharmaceutical industries. Actual industrial applications rely on fossil resources for most of the industrial production. However, these natural sources are limited and their stock cannot be refilled in a short time. In addition, they are expensive and their exploitation has a negative impact on the environment. These are the main arguments taken under consideration to launch the new world strategy with biomass as a renewable carbon source. Thus far, the biomass composition used as feedstock imposed at least three general platforms, such as sugar, terpenes and combustibles. In this context, our research group explored lignocellulose, turpentine [8,9] and oil [1–7] as biomass samples with promising perspectives of renewable C sources. Lipase-based biocatalysis systems were adapted for biomass valorization, leading to added-value products with high impact on food, cosmetics and pharmaceutical areas. Limonene/α-pinene/menthol derivatives, grafted lignin, silybin esters, glycerol carbonate and glycidol are a few examples of the reaction products based on lipase biocatalysis developed in our lab. More details about these aspects demonstrating the high impact of lipase on the efficiency of the biocatalysis process, especially for biomass as raw materials, will be provided during the lecture.

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