Immobilization of lipase onto metal-organic frameworks for enantioselective hydrolysis and transesterification

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Abstract

Enzyme immobilization enhances the catalytic activity and stability of the enzyme, and also improves reusability. Metal organic frameworks (MOFs), which possess diversified structures and porosity, have been used as excellent carriers for enzyme immobilization. Pseudomonas fluorescens lipase (PFL) has been successfully immobilized onto MOFs by covalent cross-linking to obtain a series of immobilized lipase (PFL@MOFs). PFL@MOFs are used for catalytic enantioselective hydrolysis of 2-(4-hydroxyphenyl) propionic acid ethyl ester enantiomers (2-HPPAEE) in aqueous medium and transesterification of 4-methoxymandelic acid enantiomers (4-MMA) in organic medium. The experimental results indicated that PFL@Uio-66(Zr) exhibits excellent enzymatic catalysis performances and high enantioselectives. In addition, to increase catalytic activity and reusability, PFL is modified by the polyethylene glycol (PEG) to prepare PEG-modified lipase (PFL-PEG), then PFL-PEG is immobilized onto Uio-66(Zr) to prepare PFL-PEG@Uio-66(Zr), demonstrating better reusability and catalytic activity compared with PFL@Uio-66(Zr).

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