

Fouling-induced enzyme immobilization for membrane reactors - DTU Orbit (09/11/2017)

Fouling-induced enzyme immobilization for membrane reactors

A simple enzyme immobilization method accomplished by promoting membrane fouling formation is proposed. The immobilization method is based on adsorption and entrapment of the enzymes in/on the membrane. To evaluate the concept, two membrane orientations, skin layer facing feed (normal mode) and support layer facing feed (reverse mode), were used to immobilize alcohol dehydrogenase (ADH, EC 1.1.1.1) and glutamate dehydrogenase (GDH, EC 1.4.1.3), respectively. The nature of the fouling in each mode was determined by filtration fouling models. The permeate flux was larger in the normal mode, but the reverse mode allowed for higher enzyme loading and stability, and irreversible fouling (i.e. pore blocking) developed more readily in the support structure than in the skin layer. Compared with an enzymatic membrane reactor (EMR) with free enzymes, the novel EMR with enzymes immobilized in membrane support improved the enzyme reusability (especially for ADH), and reduced the product inhibition (especially for GDH). © 2013 Elsevier Ltd.

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