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Tube-in-tube hollow fiber catalytic membrane microreactor for the hydrogenation of nitrobenzene

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Abstract

The miniaturization of membrane reactors aims to improve the mass transfer efficiency. A tube-in-tube hollow fiber catalytic membrane microreactor that contains dual characteristics of a catalytic membrane reactor and a microreactor was developed in this study. For a gas-liquid-solid (G-L-S) reactor, the immobilization of solid catalysts on a hollow fiber membrane (HFM) via layer-by-layer (LBL) self-assembly enables the model reaction of nitrobenzene hydrogenation to occur. The unique structure of the novel catalytic membrane microreactor separates the gas and liquid reactants and shortens the transfer distance. The experimental results showed that the nitrobenzene conversion was high during 30 h of continuous operation. The effects of the flow rates and inlet nitrobenzene concentration were also investigated. At a given gas flow rate, the nitrobenzene conversion and concentration of the product aniline decreased with increasing the

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