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Chunlin Mu, Kuntao Huang, Tianyuan Cheng, Hongjuan Wang, Hao Yu, Feng Peng

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Ni foams decorated with carbon nanotubes as catalytic stirrers for aerobic oxidation of cumene

Chunlin Mu, Kuntao Huang, Tianyuan Cheng, Hongjuan Wang, Hao Yu,* Feng Peng

School of Chemistry and Chemical Engineering, South China University of Technology, Guangzhou 510640, China

Abstract

Carbon nanotubes (CNTs) have received intensive scientific interests as a metal-free catalyst for the oxidation reactions of hydrocarbons in the liquid phase. However, its application in the liquid reaction is limited by the costly catalyst filtration process. Herein, a structured CNT catalyst was fabricated via growing CNTs on Ni foams with a porous Al_2O_3 coating layer. The resultant structured CNTs were used both as catalysts and as stirrer in a rotating foam stirrer reactor. The catalytic performance was evaluated in the production of cumene hydroperoxide by the aerobic oxidation of cumene. Under optimized experimental conditions, the cumene conversion reached 25.1%, 14% higher than that of commercial CNTs in a slurry reactor. The excellent adhesion strength of CNTs on the foam and catalytic stability in 5 runs of recycling were demonstrated, opening a new way to employing CNTs as a metal-free catalyst in the liquid phase reactions.

* To whom correspondence should be addressed.

yuhao@scut.edu.cn (H Yu), Tel: +86 20 8711 4916, Fax: + 86 20 8711 4916