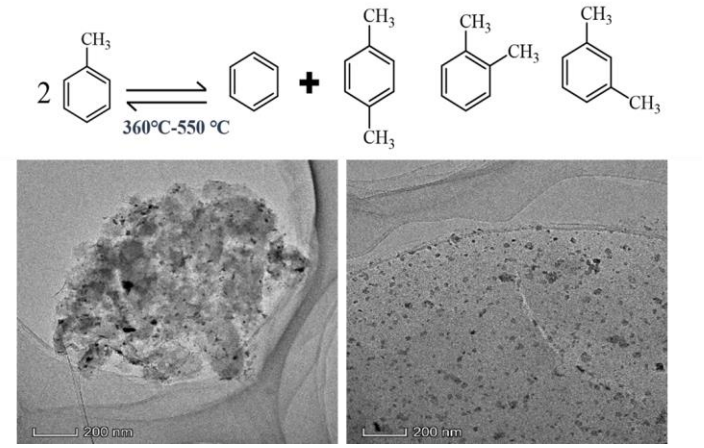
Application of activated carbon supported metal oxides in the toluene disproportionation to produce p-xylene

Da Sheng, **Jian-Gong Ma***

Department of Chemistry, Frontiers Science Center for New Organic Matter and State Key Laboratory of Advanced Chemical Power Sources, College of Chemistry, Nankai University, Tianjin 300071, China

Abstract

As a basic chemical, p-xylene is a key raw material in the production of polyester monomers, including terephthalic acid and dimethyl terephthalate. Currently, the industrial production of p-xylene relies mainly on processes such as aromatic extraction, toluene disproportionation and alkylation transfer. Toluene disproportionation processes adopt ZSM-5 zeolites in traditional industrial system, which have the advantages of high p-xylene selectivity, easy purification, low operating and production costs. However, catalytic reaction process is thermodynamically inclined to produce m-xylene. New catalysts based on supper activated carbon (with a specific surface area > 2000 m^2/g) supported metal oxides were synthesized by the method of stirring and calcination, which exhibits high thermal catalytic reactivity in the conversion of toluene (38%) with higher selectivity toward p-xylene of 36% compared to ZSM-5 zeolites. The special activated carbon demonstrates high toluene conversion and toluene adsorption performance compared to commercial activated carbon, the synergistic effect of activated carbon and metal oxides further enhances shape-selective catalytic activity under high temperature and high pressure conditions, which providing a new route for the production of p-xylene in the chemical industry.



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Biography

Jian-Gong Ma received both bachelor's and master's degrees in chemistry under the supervision of Prof. Peng Cheng at Nankai University in 2003 and 2006, respectively. After receiving his Ph.D. degree in 2011 under the supervision of Prof. Matthiass Driess at the Technische Universität Berlin, he joined Nankai University. Currently, he is the professor and academic leader at the College of Chemistry, Nankai University. His scientific focus is the synthesis and application of MOF composites, especially in catalytic conversion of CO_2 and electrochemical sensors.

Email: mybasten@nankai.edu.cn