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Water-medium clean organic reactions over solid catalysts with tunable nanostructures

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Water-medium organic synthesis represents an important branch of green chemistry due to the reduced pollution from organic solvents. Here the design of supported metal, organometal, and organocatalysts with enhanced efficiency and durability by engineering mesoporous structure, morphologies and surface chemistry are reported. (1) Mesoporous metalcatalysts: Mesoporous metal catalysts with desired morphologies are designed based on chemical reduction in the presence of surfactants, which exhibit enhanced activity in water-medium organic reactions owing to high dispersion of metal particles and diminished diffusion limit. (2) Mesoporous organometallic catalysts: (a) Grafted organometal catalysts. These catalysts were prepared by coordinating metallic ions with the PPh2-groups originally incorporated into the pore channels of the mesoporous silica and polymer supports. During water-medium organic reactions displayed higher activity. Grafting organometals onto mesoporousnanospheres could further improve catalyst activity and durability due to the facilitated diffusion. (b) Mesoporous organometallic catalysts prepared by self-assembly of organometallic silicane. These catalysts were prepared by co-condensation, which exhibited higher activity and stronger durability in water-medium organic reactions than those obtained by grafting method owing to uniform chemical environment of active sites, diminished steric hindrance and enhanced interaction between active sites and supports to inhibit the leaching. (3) Bifunctional catalysts with ordered mesoporous structure:The mesoporous immobilized catalysts containing two kinds of metal active phases, e.g., Ru(II) and Pd(II), were prepared by co-condensation. They showed highly ordered mosoporous channels and the chemical mapping showed homogeneous distribution of different active sites. As a result, such catalyst exhibited high efficiency in one-pot cascade reactions.

Biography

Hexing Li received his PhD degree in Chemistry from Fudan University in 1998. He is Professor of Chemistry in Shanghai Normal University, joint Professor positions in East China Normal University and East China Science and Technology University. Besides, he is the President of Shanghai University of Electric Power, an Associate Editor of Appl. *Catal. B Environ*. and Editorial Board of *Current Green Chem*., *Catal. Commun., Current Org. Chem*, *Res. Chem. Inter.,* and *J. Nanoeng. Nanomanufact*. His research interests are related to the design of amorphous alloy catalysts, photocatalysts and organometal catalysts for green organic reactions and environmental cleaning. Up to now, more than 80 papers with IF>5 have been published and 45 patents have been registered in China. Besides this he has published 3 monographs and 9 textbooks.

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