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Green mesostructured catalysts

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Abstract

The discovery of highly ordered mesoporous silicate materials with high surface area, large uniform pore size, and large pore volume has attracted great interest for their potentially wide catalytic applications. Particularly, the mesoporous SBA-15 is synthesized using Pluronic P123 triblock copolymer as a structure directing agent under strong acidic hydrothermal method. However, the introduction of higher heteroatomic species into SBA-15 under the similar method is very difficult because the formation of metal-oxo species in the mesoporous material is much less whereas ~75% heteroatoms can be leached out during filtration, and the poisoned-catalytic products are easily formed by certain metal oxides on the surface of SBA-15. To overcome the above problems, using the pH-adjusting direct hydrothermal (pH-aDH) method introduced, for the first time, by Selvaraj and his research group, several heteroatoms, such as Al, Ga, Mn, Sn, Cr, Nb, Ce, Cu, V and Ti, have been successfully incorporated in the framework of SBA-15 with very high metal species loadings. On the bases of characteristic results obtained for the synthesized mesoporous materials, the incorporation of higher heteroatomtic species into SBA-15 materials is found to create the higher mild Brønsted and Lewis active sites on their surface pore walls with enhanced hydrothermal stabilities. These materials have been successfully used as the green catalysts in the production of fine chemicals / petrochemicals with 90-100% selectivity under novel green catalytic methods, and the mesoporous catalysts have been also recycled in these catalytic reactions to find their catalytic stabilities. These works will be presented with the details of explanation.

Biography

Since 2008, Prof. Selvaraj is working in the School of Chemical and Biomolecular Engineering at Pusan Nati University (PNU), Korea. His research field is “Nanoporous Materials and Their Green Applications”. In 2003, he rece his Ph.D. award in Catalytic Chemistry at Anna University, Chennai, India. He published more than 70 rep international articles. He serves as a Primary Reviewer for the above 60 International Journals, and as a member of Boa Examination at more than 10 Indian National Universities and Institutes. He has delivered more than 30 invited/key lectures in a variety of international conferences and research institutes, and chaired for a session in diverse Internati Conferences. In 2012, from his outstanding publications, he has been generously selected as a member of Royal Cher Society, and as a member of review committee in the National Research Council-CNCS, Government of Romania. He received several Research Project Grants from National Organizations of Korea and Singapore. Prior to taking up a fa at PNU, he worked as a Research Professor at Yonsei University, Korea from January 2004 to August 2005. After recei a Prestigious Award “Singapore Millennium Fellowship Award” by Singapore Millennium Foundation (SMF) directe Government of Singapore, he moved to Singapore to work as a SMF Research Fellow at National University of Singa from October 2005 to September 2007.