

## Catalysis by mesoporous materials for fine chemicals production

V. Murugesan

Department of Chemistry, Anna University, Chennai 600 025, INDIA

There is a need for environmentally benign processes for the synthesis of fine and specialty chemicals. In general, fine chemical synthesis requires various successive steps, and many of them are carried out in homogeneous phase using stoichiometric amount of acid catalyst such as  $\text{H}_2\text{SO}_4$ , HF,  $\text{AlCl}_3$ , etc. These acids are not reusable and have to be neutralized, which generate large amount of waste posing environmental problems. Therefore, new processes in the production of fine and specialty chemicals materials play an important role in the development of clean and efficient processes for the production of fine chemicals and pharmaceuticals. Alkylation of phenol and m-cresol is an industrially important reaction because many alkylated and acylated products have commercial applications.

Hexagonal mesoporous pure AIPO, MgAPO and CoAPO were successfully synthesised at room temperature using cetyltrimethylammonium bromide as the structure directing agent. Al,Zn-MCM-41 was synthesized by hydrothermal method using cetyltrimethylammonium bromide as the structure directing agent. Hexagonal mesoporous Co,Al-MCM-41 and Fe,Al-MCM-41 were synthesised by hydrothermal method using tetradecyltrimethylammonium bromide as the template. All these materials were characterized extensively. The catalytic activity of these materials was evaluated for different alkylation reactions. *tert*-Butylation of m-cresol with *tert*-butanol was carried out over mesoporous AIPOs. High conversion of m-cresol was observed over mesoporous CoAPO due to high acid sites present in the catalyst. A novel route to produce thymol by vapour phase reaction of m-cresol with isopropyl acetate was studied over Al-MCM-41 and Al,Zn-MCM-41. Fe, Al-MCM-41 and Co, Al-MCM-41 was used as catalysts for *tert*-butylation of phenol using *tert*-butanol and isobutanol respectively as the alkylating agents. Thus solid acid catalysts such as mesoporous AIPOs, MCM-41 could be viable and ecofriendly alternative to mineral acid catalysts in the synthesis of fine and specialty chemicals.