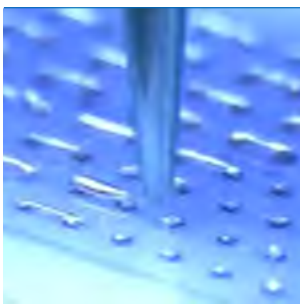
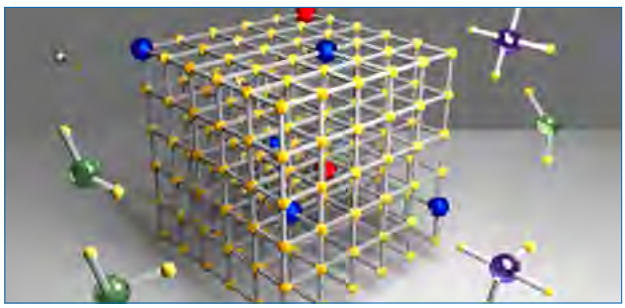
Keynote Forum
May 13, 2022

Nanomaterials Congress 2022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Hierarchically structured nano porous zeolitic materials and their application for esterification of biomass derived levulinic acid

Nano porous zeolites are versatile, environmentally benign and proven solid acid catalysts. They are widely used in a variety of organic transformations owing to their tunable acidity, good thermal stability and unique shape selectivity properties. The zeolites invariably consist of tetrahedral silicate units that are linked through corner sharing of oxygen atoms of the tetrahedra resulting in a network which are assembled systematically resulting in an ordered pore structure. The inner voids are generally between 0.38 and 0.73 nm. The functionality of the silicate system is gained through the substitution of lower valent aluminum atoms – i.e., 3+ charge in 4+ resulting in a negatively charged framework. When this negative charge is compensated by a proton, a strong solid acid is created. This acid proton present in the inner walls of the micropores can be used for a range of catalytic reactions. However, sometimes, poor catalytic activity is realized when processing bulkier molecules due to the access of active sites residing within the micropores. In addition, microporous structure and complex nature of the channel and cavities of zeolites can cause diffusion limitations preventing the use of these solids for successful catalytic processing. Hierarchization of conventional zeolites is recently seen as one of the promising strategies to overcome their diffusional restrictions and make entry and exit of bulkier reactant/product entities easy and possible. In this context, an attempt has been made to synthesize hierarchical zeolite H-BEA by modifying conventional zeolite H-BEA via controlled desilication post modification route, by making use of cationic surfactant and natural macro template. Here, in this presentation, the advantage of using hierarchical zeolites for processing esterification of biomass derived organic acids will be discussed. The presentation will also cover a brief procedure of creating hierarchical structures as well as the methods that were used to establish the presence of these structures.

Recent Publications

1. Dhara H Mora Wala, Ajay K Dalai, Kalpana C Maheria. Synthesis of n-Butyl Levulinate Using Mesoporous Zeolite H-BEA Catalysts with Different Catalytic Characteristics. Article Catalysis Letters. 2020; 150: 1049-1060

2. Henil Kumar M Lanka Pati, Dharmesh R Lathiya, Lalita Choudhary, Ajay K Dalai, Kalpana C Maheria. Mordenite-Type Zeolite from Waste Coal Fly Ash: Synthesis, Characterization and Its Application as a Sorbent in Metal Ions Removal. Article Chemistry Select. 2020; 5: 1193-1198

3. Dharmesh R Lathiya, Dhananjay V Bhatt, Kalpana C Maheria. Sulfated Fly-Ash Catalyzed Biodiesel Production from Maize Acid Oil Feedstock: A Comparative Study of Taguchi and Box-Behnken Design. Article Chemistry Select. 2019; 4: 4392-4397.

Speaker Biography

Kalpana C. Maheria is currently working as an Associate Professor, Department of Chemistry, SVNIT, Surat, Gujarat, India. She has about >20 years of teaching and >14 years of research experience. She has obtained her Ph.D. from MSU, Vadodara, Gujarat, in 2007 and performed her post-doctoral research work at University of Saskatchewan, Canada, during February 2012 to October. 2013. She has been to University of Saskatchewan, Canada as Visiting Professor. Her research interests include heterogeneous catalysis, nano porous materials, green synthesis of pharmaceutics via MCRs, biodiesel production and water treatment. She has to her credit > 56 publications, ~92 research paper presentations, two granted Indian patents, two book chapters and ~30 invited talks. She has guided 8 Ph.D. students (7 pursuing) and 26 Master dissertations (3 pursuing). Dr. Maheria is a Fellow of Indian Chemical Society.

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