CBI-Kolloquium SS 2010

Die Vorträge finden jeweils um 16.15 Uhr im Hörsaal H3, Egerlandstr. 3 statt.
Alle Interessenten sind herzlich eingeladen.

20. Mai 2010, 17^{15}, Hörsaal H2

Bitte von der Regel abweichenden Termin (Ort und Zeit) beachten!

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Novel Advanced Functional Nanoporous Materials for Catalytic Applications

Nanoporous carbon materials have attracted much attention in the recent years due to their enormous applications in the fields of adsorption, catalysis, and fuel cells.However, the incorporation of hetero atoms such as boron and nitrogen in the carbon materials can significantly change their electronic and semi-conducting properties. Recently our group has discovered a new family of nanoporous materials such as nanoporous carbon nitride with different structures, morphology, and pore diameters. In the first part of the talk, I will discuss about the preparation techniques, basics and the mechanism behind the synthesis of various nanoporous nitride materials with different pore structure and textural parameters.One of the important features of the materials is that they have inbuilt basic sites in the form of NH2 or NH groups and can be used as a metal free basic catalyst. I will also demonstrate the basic catalytic performance of these materials in the transesterification of beta-ketoesters with different alcohols, aldol and Knoevenagel reactions and their ability to capture acidic CO_2 molecules. In the second part of the talk, I will be focusing mainly on the fabrication and the catalytic application of amorphous and crystalline metallosilicate catalysts with 3D structure. Especially, the conversion of non-catalytic pure silica materials such as SBA-1, SBA-15, and KIT-5 into highly active catalytic materials by incorporating metal species in the framework in a highly acidic medium will be demonstrated. I introduced two novel concepts for the metal incorporation in the silica framework. These concepts involve: 1. Controlling the water to hydrochloric acid molar ratio in the synthesis gel for the fabrication of metal substituted SBA-15 and KIT-5, which can reduce the pH of the synthesis medium and can enhance the interaction between the metal species and the silica species in the acidic medium; and 2. Changing the local concentration of the H+ ions in the synthesis mixture to promote local contact between the Si and metal species (for SBA-1) as the synthesis procedure is highly sensitive. The catalytic applications of the materials including alkylation, acylation, multicomponent coupling and condensation reaction will be presented. At the end of the talk, the fabrication of highly crystalline and acidic nanoporous metallosilicate materials and heteroplyacids with different morphology and their catalytic application will also be demonstrated.