Keramische Werkstoffe und Bauteile
Prof. Dr.-Ing. Kurosch Rezwan
Fachbereich 4 - Produktionstechnik

Graduiertenkolleg MIMENIMA
DFG GRK 1860

Guest Seminar 25.11.2013 / IW 3, room 0330 14 .00 – 16.00 Uhr

Title:
Structuring adsorbents and catalysts by processing of porous powders

Speakers:

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Abstract
Microporous materials are suitable for catalysis and separation applications. Such zeolites, metal organic frameworks, activated carbons and aluminum phosphates are invariably produced in particulate forms. For better performance, there is need to transform microporous particulates into hierarchically porous structures as adsorbents or catalysts. This would enable an optimized structure with high mass transfer, low pressure drop, good heat management, and high mechanical and chemical stability. The requirements and important properties of such hierarchically porous structures as adsorbents and catalysts are reviewed with a focus on applications in catalysis and gas separation. Versatile powder processing routes to process porous powders into hierarchically porous structures like extrusion, coatings of scaffolds and honeycombs, colloidal processing and direct casting, and sacrificial approaches are presented and discussed. The use and limitation of inorganic binders like clays and silica are presented. Recent advances to produce binder-free and complex shaped hierarchically porous monoliths are described and their performance is compared with traditional binder-containing structured adsorbents. Needs related to better thermal management and improved kinetics and volume efficiency are discussed and an outlook on future research is also given.