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Structuring of nano-porous powders into hierarchically porous nano-structured adsorbents for de-carbonization

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Nano-porous materials such as zeolites, metal organic frameworks, activated carbons and aluminum phosphates are suitable for catalysis and gas separation applications. These high surface area materials are invariably produced in particulate form and need to be assembled into mechanically strong hierarchically porous macroscopic structures such as structured monoliths, honeycombs and laminates for industrially important catalysis and gas separation applications. Structuring of nanoporous powders enables an optimized structure with high mass transfer, low pressure drop, efficient heat management and high mechanical and chemical stability. Important properties of the nanostructured adsorbents structures will be discussed with a focus on CO_2 separation e.g. from power-plant flue gas. A versatile nano-structurization approach to process nano-porous powders into hierarchically porous monoliths with high CO_2 capture capacity, CO_2 over CH_4 and CO_2 over N_2 selectivity, rapid uptake and release kinetics and high mechanical strength will be discussed. A figure of merit criterion will be defined to evaluate the performance of these structured adsorbents. Finally, the concepts of adsorption and diffusion, mass and heat transfer will be combined in a discussion of the optimal porous architecture and geometry of nanostructured adsorbents.

Biography

Farid Akhtar has completed his PhD from University of Science and Technology, Beijing and Post-doctoral studies from Stockholm University, Department of Materials and Environmental Chemistry. He is an Associate Professor at Division of Materials Science and Lulea University of Technology in Sweden. He has published more than 80 papers in reputed journals and has been serving as an Editorial Board Member of *International Journal of Refractory Metals and Hard materials*.

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