



Evolution and Development of Porous Materials: prospects in the Environmental Application Fields based on their ion exchange properties

Martedì, 19 marzo – ore 16:30
Aula Arduino

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Abstract

Porous materials are of great importance for the progress in many technological and environmental fields, such as catalysis, adsorption, separation and ion exchange, because of their unique pore topologies, tunable structures, and the possibility to introduce active reaction sites. To describe a porous structure, several parameters may be used and these include pore size and shape, channel dimensionality and direction, composition and features of channel walls, etc. According to the aperture size of pores, porous compounds can be classified as microporous (aperture diameter less than 2 nm), mesoporous (aperture diameter of 2–50 nm), and macroporous (aperture diameters larger than 50 nm) materials, respectively. Microporous materials with regular pore architectures comprise wonderfully complex structures and compositions. Their fascinating properties, such as ion-exchange, separation, and catalysis, and their roles as hosts in nanocomposite materials, are essentially determined by their unique structural characters, such as the size of the pore window, the accessible void space, the dimensionality of the channel system, and the numbers and sites of cations, etc. The goal of this talk is to provide a platform to discuss new insights in stability, structure and properties of porous materials with particular attention to zeolites, as well as in innovative aspects in their processing and applications. The emphasis is on the relationships between the structure and/or chemical composition and the specific physical properties of these materials, their role in mineralogical, technological, green as well as sustainable processes.

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