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Chemistry of active species in the nanospace of metal organic frameworks

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Nanoporous compounds have been widely used because of their practical functions for gas storage, separation, and in molecular catalysis. Surface activity on the nano-pore is essential for the porous properties. Therefore, a number of attempts have been made to introduce specific functional groups (e.g. acid–base sites, ion-exchange sites, chemical interaction sites, hydrogen bonding sites, chiral sites, etc.) onto the internal surface for tuning the pore environment and metrics.[1-6] However, the functional species used in this context are limited to those that are sufficiently inert such as not to spoil porous structures. This has prevented access to many important highly reactive functionalities such as electronically open shell atoms that play pivotal role in many important chemical transformations but often elude isolation and characterization. Furthermore, if it is possible to activate nanopore surface by external stimuli where and when you want to, on-demand gas storage/trapping systems can be realized. We will report the synthesis, structure, and sorption properties of new MOFs with active species on their pore surface. Furthermore, we will discuss the photochemical activation of the MOFs.

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