Zeolite multifunctional design for catalytic applications

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The importance of zeolites and related materials within the field of heterogeneous catalysis relies not only on their microporous structure and shape selectivity, but also on the flexibility of their chemical composition and versatility to achieve multifunctional catalysts by introducing metals and changing acidic, basic and redox properties. The development of effective means to control the location and accessibility of active sites in zeolite frameworks has an essential impact in the catalytic properties of these materials. Despite the changes in synthesis procedure leading to different crystal size and crystal morphology, the synthesis of mesoporous analogues of zeolites (so called hierarchical materials combining micro and mesoporosity) are another alternative for increasing the catalytic potential of zeolites.

Besides the large applications as catalysts in refining and petrochemistry, zeolites presents an increasing potential for environmental catalysis, direct conversion of CO2 into fuels and conversion of biomass to liquid fuels and/or chemicals. The development of these new processes requires novel multifunctional zeolites and attests the importance of how to tailor and design zeolite and related materials properties to control/enhance the catalytic performances.