Metal Organic Frameworks for Energy Related Applications

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Metal Organic Frameworks are a recent class of porous crystalline hybrid solids. They possess an unprecedented structural and chemical versatility due to the quasi infinite combination of metal ions and polytopic ligands leadings to thousands of micro or mesoporous architectures with tunable properties (acidity, hydrophobic/hydrophilic balance, pore size and shape). These materials have been to date proposed for a large range of applications such as gas storage, separation, catalysis, energy or more recently biomedicine. [1] One of the main limitations prior to their integration into real applications lies in their often limited chemical stability under operating conditions. Our group has reported within the past decades series of robust MOFs based on high valence metal cations and cheap ligands following green strategies to produce materials able to compete with benchmark porous materials (zeolites, carbons…). [2-3] We will summarise our most recent findings in the field of energy, from heat reallocation (e.g. refrigeration) to materials for fuel cells (proton conductivity) based on the design of new aluminum, titanium, iron or zirconium based MOFs. [4-8]

References

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