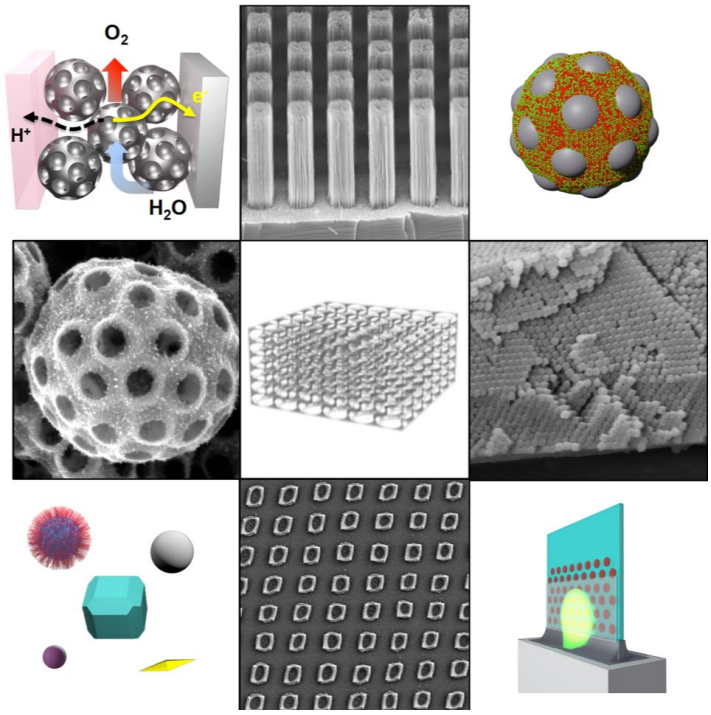
**Exploring the chemical space and the structural diversity of colloidal based porous materials**




Functional porous materials play a pivotal role in several energy and environmental related applications. The performance of these materials largely depends on our ability to shape them at various scales, control their composition and "program" their response. During this presentation, I will discuss our recent endeavors in designing porous materials by colloidal self-assembly by following on three directions:
(i) Exploring the chemical space: I will show that the reactivity of polymeric colloids can be engineer to fabricate porous materials with "complex" compositions such as noble metal oxides,[1] metals,[2] High Entropy Alloys[3] for (electro) catalysis[4] and lithography.[5]
(ii) Engineering defects: a drawback, crack formation in colloidal assembly, can be harnessed towards an original patterning method for porous oxides[6] or Metal-Organic Frameworks (MOFs)[7] for photonics.[8]
(iii) Programming in time: I'll illustrate our recent efforts in designing self-regulating porous materials;[9] taking inspiration from living systems, feedback mechanisms can be integrated in porous materials such as colloidal MOFs[10] to program actions in time.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3. M. L. De Marco; et al**, ACS Nano**, 16, 15837-15849, 2022.
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6. M. Odziomek; et al , **Advanced Materials,** 34, 2204489, 2022.
7. O. Dalstein; et al, **Angewandte Chemie International Edition**, 56, 14011-14015, 2017
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