Twice sustainable: low temperature, green wet-chemistry and colloidal routes towards the environmental friendly synthesis of inorganic nanostructures for energy applications and catalysis

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The paradigms of green and sustainable chemistry are currently catalysing sharply growing interest in all fields of chemistry[1]. In particular, synthetic inorganic chemistry represents an exciting playground for the design and optimization of green chemistry-inspired routes, minimising the use of critical raw materials and the carbon footprint of the related processes. In this regard, the implementation and extension of the green chemistry paradigms to inorganic chemistry represents one of most bewitching developments. This should be achieved by applying sustainable and energy-efficient procedures, involving the lowest amount of toxic chemical and/or solvents, earth-abundant precursors, safe procedures which are easy to implement and to scale-up and, last but not least, low temperature and low energy consumption. In this framework, in these last years, in our group we have developed different low temperature (T<150°C) wet chemistry routes to prepare different inorganic functional nanomaterials in crystalline form, ranging from ferrites[2] and manganites[3], to pure and doped metal oxides, sulphides, and halogenides, to metal/metal oxide nanocomposites. The adopted wet chemistry routes ranged from 1) miniemulsions[4] to 2) coprecipitation combined with hydrothermal route[2] to 3) classical colloidal routes. Exciting results could be achieved by the combination of the above mentioned routes[5].
This contribution provides an overview of the *pros* and *cons* of the proposed routes for the obtainment of targeted inorganic colloids, also outlining as the role of a combination of analytical tools can unravel the complex interplay among experimental parameters and microstructure of the materials.

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