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VABILO NA PREDAVANJE
V OKVIRU DOKTORSKEGA ŠTUDIJA
KEMIJSKE ZNANOSTI

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z naslovom:

Low temperature and sustainable synthesis routes for inorganic nanomaterial

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Abstract:

Control on shape, morphology, size and crystallinity of inorganic nanomaterials are major requirements not only in the fields of catalysis and photocatalysis, but also for bioimaging and environmental applications. In this context, the paradigms of green and sustainable chemistry are currently raising a sharply growing interest in all fields of inorganic materials chemistry [1]. In this framework, resorting to sustainable, green and easy scalable wet-chemistry, typically aqueous-based, synthesis routes is a convenient approach to produce nanostructures for different functional applications. In particular, inorganic chemistry represents an exciting playground for the design and optimisation of green chemistry-inspired routes which can also be implemented on a larger scale, which is a relevant aspect for industrial applications of catalysts. The controlled exploration of experimental parameters discloses exciting perspectives in orienting, *inter alia*, the morphogenesis and the final structure and shape of the crystalline materials. In this framework, we have explored and optimised different low temperature (T< 150°C) and sustainable wet chemistry and colloidal routes [1, 2] and developed an efficient and versatile synthetic toolbox (Figure 1) encompassing (i) hydrothermal routes [3], (ii) very low (0°C) temperature precipitation, (iii) continuous flow synthesis, (iv) seeded-growth) and combinations thereof, to prepare different inorganic functional nanomaterials ranging from metal and metal alloys nanoparticles for gas exhaust after-treatment, pure and doped metal oxides for optical bioimaging and possible oxidation catalysis reactions, doped zinc sulphide for optical bioimaging and photocatalysis. Common factors of all these approaches are the low temperature of processing, the easy procedure, the reproducibility, the possibility to up-scale the optimised route, the achievement of highly crystalline and size-controlled nanostructures.

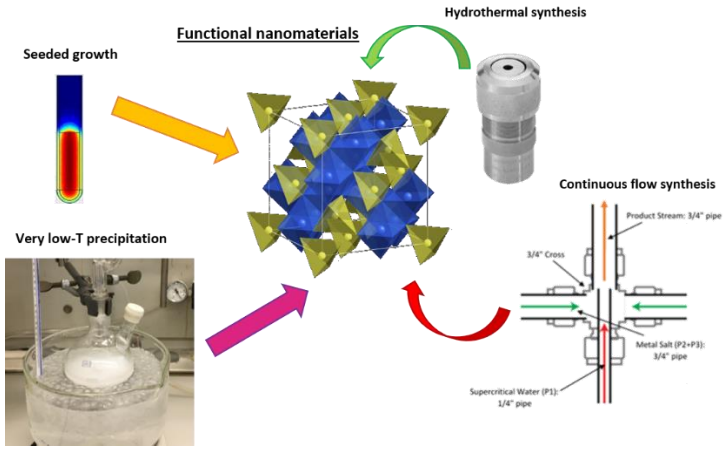

Figure 1- Synthetic toolbox for low temperature synthesis of inorganic nanostructures

[1] S. Diodati, P. Dolcet, M. Casarin, S. Gross; Chem. Rev. 2015, 115, 11449–11502
[2] P. Dolcet, S. Diodati, M. Casarin, S. Gross; J. Sol-Gel Sci Technol. 2015, 73, 591-604
[3] P. Dolcet, S. Diodati, F. Zorzi, P. Voepel, C. Seitz, B. Smarsly, S. Mascotto, F. Nestola, S. Gross; Green Chem. 2018, 20, 2257-2268