Nanostructured Materials from Non-Aqueous Sol-Gel Approaches: Optical, Magnetic and Gas Sensing Properties

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Non-aqueous sol-gel routes are elegant approaches for the synthesis of nanomaterials[1]. Here, it will be shown that these approaches were successfully used for the formation of high quality pure inorganic nanocrystals [1] and ordered hybrid organic-inorganic materials [2]. Especially, the chemical mechanisms taking place during the metal oxide formation greatly influence the morphology, assembly and the final properties.

The peculiar structure and the formation mechanism of organic-inorganic hybrid materials and inorganic nanoparticles doped with magnetic ions will be detailed and correlated to their properties [3]. Especially, the optical properties of lanthanide doped hybrid materials strongly depend on the organic moieties forming the hybrid mesostructure [2].

Pure semi-conducting metal oxide nanoparticles synthesized in non-aqueous media without the need of surfactants are good candidates for resistive gas sensor devices due to their nanometric size, good crystallinity and high purity [4]. Selected examples of gas sensor fabricated with porous thick layers made of nanoparticles will be presented.

References:

[1] N. Pinna, M. Niederberger, *Angew. Chem. Intl. Ed.* **2008**, in print
[2] N. Pinna, *J. Mater. Chem.* **2007**, 17, 2769
[3] G. Clavel, M. Willinger, D. Zitoun, N. Pinna, *Adv. Funct. Mater*. **2007**, 17, 3159
[4] G. Neri, N. Pinna, *Resistive chemical sensors from metal oxides nanocrystals synthesized in organic solvents*, in Nanomaterials: New Research Developments, Nova Science Publishers, **2008**, in print.

Figures:

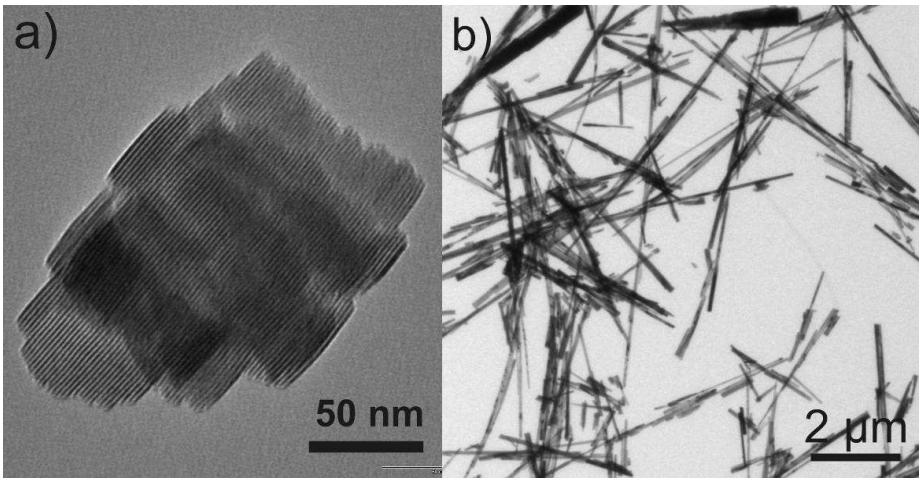

Fig. 1: TEM overview images of the a) neodymium oxide – benzoate hybrid nanostructure, b) Cobalt doped zinc oxide nanowires