# Oxide Synthesis as Cornerstone of Nanoscience

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Research on metal oxide nanoparticles, including synthesis, characterization of the structural, chemical and physical properties, assembly into larger structures extending over several scales of lengths, and application in various fields of technology, represents a fundamental cornerstone of nanoscience and nanotechnology. The large number of different synthesis techniques developed in the last few years gave access to metal oxide nanoparticles with a wide range of compositions, monodisperse crystallite sizes, complex crystallite shapes, and assembly properties. Due to the great variety of structures and properties, metal oxide nanoparticles already have a significant impact in diverse fields such as nanophotonics, spintronics, energy storage and conversion, catalysis, biomedical applications, sensors and actuators, etc.

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This topical issue of the *European Journal of Inorganic Chemistry* contains a collection of invited and contributed papers presented at *Symposium A: Chemistry and Processes for the Design of Metal Oxide Nanoparticles* of the EMRS fall meeting, which was held in Warsaw on September 17−21, 2007. Symposium A was chaired by U. Narkiewicz, J.-F. Hochepied, M. Niederberger, and N. Pinna. As not all of the 130 papers accepted for the Symposium could be printed in one special issue, the final selection was made by the peer review of the journal, and, finally, 22 original articles are published in this special issue. Although an integral part of the Symposium was focused on different synthesis routes to metal oxide nanoparticles, which include a broad variety of liquid as well as gas-phase approaches, important aspects regarding applications in (photo)catalysis, coating technology, solar cells, medicine, or batteries were also highlighted. Special attention was given to contributions combining original syntheses and mechanistic investigations, elaborating the key parameters for tailor-made nanomaterials.

The great topical broadness of the Symposium is also reflected in this special issue. For example, the first article is a microreview by D. Cozzoli et al., which presents the state of the art of hybrid- or hetero-nanocrystals (i.e. nanocrystals consisting of two or more chemically different material sections interconnected through permanent inorganic interfaces). T. Hyeon et al. introduce a large-scale synthesis of ceria nanoparticles from cerium chloride in the presence of oleylamine. M. Epifani et al. describe the successful preparation of very small and almost monodisperse $SnO_2$ and $CeO_2$ nanoparticles by injecting metal sols in a hot coordinating solvent. Highly luminescent $LaPO_4$:Ce,Tb nanocrystals synthesized in ionic liquids are reported by C. Feldmann et al. A. Gedanken et al. show how to produce $In_2O_3$ nanoparticles coated by amorphous carbon in a simple, one-step decomposition process. S. E. Pratsinis et al. present how to monitor and control particle size and aggregation in flame aerosol syntheses. However, these papers represent just a small selection, and many other chemical and physical approaches to nanoparticles are presented and discussed in this issue.

Finally, we would like to acknowledge the hard work of the symposium participants for meeting the numerous deadlines to enable the publication of this topical issue only five months after the meeting. Special thanks go to Karen J. Hindson, editor of *EurJIC*, and to the editorial staff who constantly supported us during the compilation of this special issue.

We hope that you will enjoy the papers assembled here and that they will be useful in your future research, for example, in finding the appropriate synthesis method for a targeted material with the desired properties.

  