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| Autore | Anastasescu Crina |
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| Soggetti | Ceramics Glass Composites (Materials) Composite materials Nanochemistry Nanoscale science Nanoscience Nanostructures Optical materials Electronic materials Lasers Photonics Catalysis Ceramics, Glass, Composites, Natural Materials Nanoscale Science and Technology Optical and Electronic Materials Optics, Lasers, Photonics, Optical Devices |
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| Nota di contenuto | Introduction (general considerations on the 1 D oxide nanostructures) -- Synthesis of oxide nanotubes by sol-gel method -- Synthesis of oxide nanotubes/nanorods by hydrothermal method. |

This book presents wet chemical sol-gel and hydrothermal methods for 1D oxide nanostructure preparation. These methods represent an attractive route to multifunctional nanomaterials synthesis, as they are versatile, inexpensive and, thus, appropriate for obtaining a wide range of oxide materials with tailored morphology and properties. Three specific oxides (SiO_2 , TiO_2 , ZnO) are discussed in detail in order to illustrate the principle of the sol-gel and hydrothermal preparation of 1D oxide nanostructures. Other oxides synthesized via this method are also briefly presented. Throughout the book, the correlation between the tubular structure and the physico-chemical properties of these materials is highlighted. 1D oxide nanostructures exhibit interesting optical and electrical properties, due to their confined morphology. In addition, a well-defined geometry can be associated with chemically active species. For example, the pure SiO_2 nanotubes presented a slight photocatalytic activity, while the Pt-doped SiO_2 tubular materials act as microreactors in catalytic reactions. In the case of titania and titanate nanotubes, large specific surface area and pore volume, ion-exchange ability, enhanced light absorption, and fast electron-transport capability have attracted significant research interest. The chemical and physical modifications (microwave assisted hydrothermal methods) discussed here improve the formation kinetics of the nanotubes. The ZnO nanorods/tubes were prepared as random particles or as large areas of small, oriented 1D ZnO nanostructures on a variety of substrates. In the latter case a sol-gel layer is deposited on the substrate prior to the hydrothermal preparation. Using appropriate dopants, coatings of ZnO nanorods with controlled electrical behavior can be obtained.
