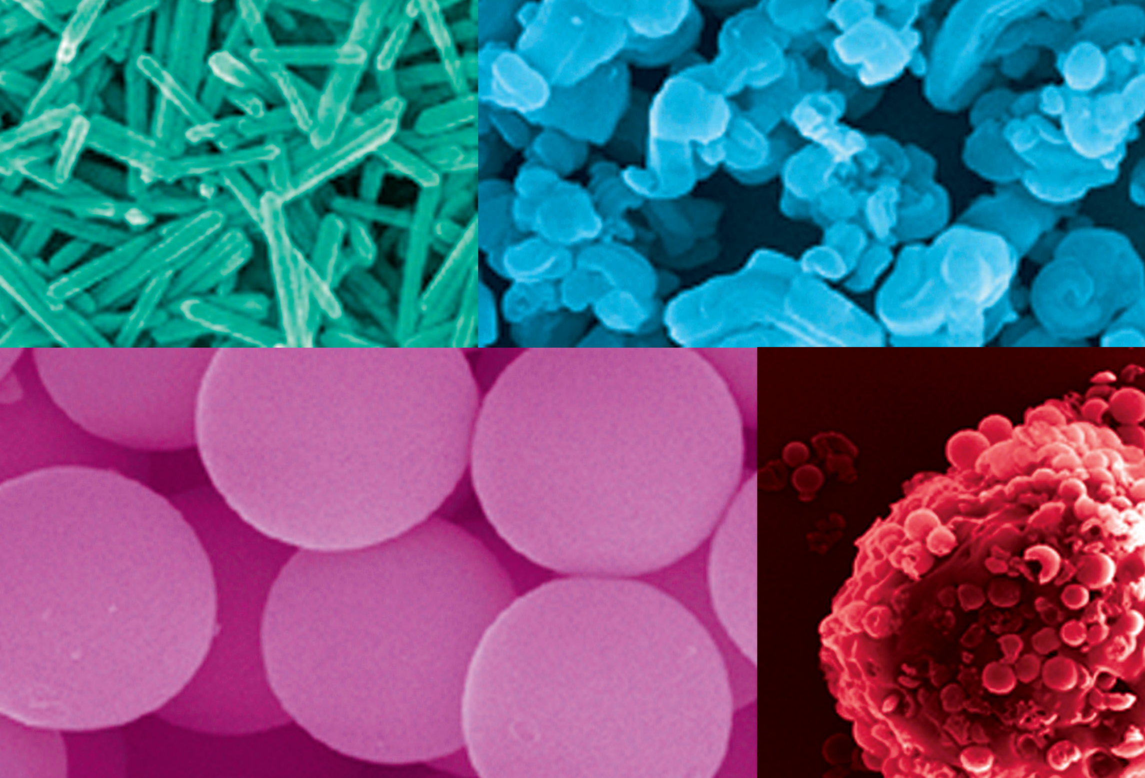

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CONTROLLED NANOFABRICATION

ADVANCES AND APPLICATIONS

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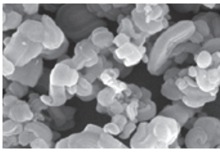

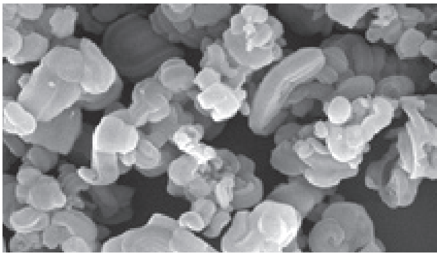

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Contents

Preface

Today, there is global consensus on the importance of nanotechnology. The major economies of the world depend on important areas of nanotechnology for science and technology development. When the size and the shape of materials are reduced to the nanoscale dimension, their physical and chemical properties can change dramatically. This book focuses on the controlled size and shape of nanostructured materials and their applications. The applications cover a broad field, especially energy-related uses. The book may be the first to clearly point out the relationship between the size and the structure of the materials, which strongly affects their properties. Understanding these control parameters has important technological implications for energy conversion and storage, biotechnology, lighting and display, and so forth.

The content is organized into 17 chapters. Chapter 1 introduces readers to the theme of the book. Chapters 2 to 5 present examples of crystal faces of TiO_2 and ZnO and the effects of shaping on their photocatalysis and cytotoxicity. Chapter 6 is a review of functionalized porous materials as drug carriers. Chapters 7 and 8 focus on the shape- and size-selective synthesis of gold nanomaterials for biomedical and photocatalytic applications. Chapters 9 to 11 demonstrate the size- and shape-controlled self-assembly of hybrid inorganic nanomaterials and their application for low-temperature CO oxidation. Chapters 12 to 17 focus on the shape-controlled synthesis of nanostructured materials for application in fuel cells, supercapacitors, Li-ion batteries, light-emitting diodes, and field emission display.

I thank the authors, globally recognized in their fields, for their invaluable contributions, which have made this book comprehensive and a very useful reference for scientists and students.

Ru-Shi Liu