Preface

Magnetism is an old but still promising field that encountered in everyday life. In recent years, the integration of state-of-the-art magnetic materials with advanced nanotechnology has driven magnetic materials into the "nano" era, and forms a new term "magnetic nanomaterials". These magnetic nanomaterials possess extraordinary unique magnetic properties such as single domain, superparamagnetism, and specific magnetism due to their unique characteristics induced by nanosized effects, and caused great attentions in either research or industry. As a result, they have blossomed into one of the most important branches in magnetic materials, which used alone or accompanied with other materials, show great potentials in biomedicine ranging from magnetic resonance imaging to magnetic-mediated hyperthermia, molecular imaging, diagnostics and cancer therapy.

This book aims to address cutting-edge progress in the area of synthesis and biomedical applications of magnetic nanomaterials. It compiles a broad spectrum from fundamental principles to technological advances, from synthesis and modification to biomedical applications along with biocompatibility. The main topics include principles in nanomagnetism, technologies for magnetic nanomaterials fabrication, developments in their biomedical applications, and the challenges in the toxicity in clinical translation.

The book is contributed by leading researchers in chemistry, magnetism, nanomaterial and biology worldwide. The first part introduces the principles of nanomagnetism and specific properties in magnetic nanomaterials. Then, some typical fabrication strategies in magnetic nanomaterials for controlled composition, morphologies and sizes are reviewed; and surface modification methods with better hydrophilcity and biocompatibility are presented. Next, magnetic nanomaterials-based applications in biomedical field are highlighted in detail, mainly including magnetic resonance image, magnetic hyperthermia, cancer therapy, multi-mode imaging, imaging-guided therapy and manipulation of biological objects. Finally, biocompatibility issues caused by magnetic nanomaterials are also overviewed.

Currently, researches in magnetic nanomaterials are moving rapidly with their synthesis ways and applications fast changing. As the applications of magnetic nanomaterials have broadened into various fields, strategies introduced in this book for synthesizing and modifying magnetic nanomaterials are also suitable for the applica-

tions in new energy, communication, and environmental fields. The main audiences of this book are graduate students and professional researchers in magnetism, materials science and engineering, nanoscience, biomaterials and life science. It is believed that, with the cooperation of magnetists, nanomaterials scientists and biologists, magnetic nanomaterials will definitely get more breakthroughs and be transferred to clinical use in more fantastic ways in near future.