Preface

Nowadays, nanomaterials are attracting huge attentions not only from a basic research point of view but also for their potential applications. Since finding the structure-property-processing relationships can open new windows in the application of materials, the material characterizations play a crucial role in the research and development of materials science and engineering. Real-time and in-situ monitoring of the processing of nanomaterials is essential to understand their synthesis mechanism and properties. Since X-ray is sensitive to structural features with lengths from 10^{-3} to about 10 nm as well as to dynamic properties with characteristic time scales from about 10^{-16} to 10^{3} s, it is a powerful ingredient for exploring nanomaterials by X-ray–based techniques in the areas of scattering, diffraction, absorption, imaging, reflection, and photoelectron emission. Improvements in X-ray–based characterizations require increasing of the intensity, collimation, and focusing of the beam as well as tuning of the wavelength, which can be obtained by accelerator-based "light sources" facilities where investigations under specific conditions of pressure, temperature, and electric or magnetic fields, or even in-situ characterizations during synthesis, are possible.

The increasing demand for energy with the necessity to find alternative renewable and sustainable energy sources leads to the rapid growth in attention to energy materials. In this book, the results of some outstanding researches on synchrotron-based characterization of nanostructured materials related to energy applications have been collected. The editors would like to thank the authors for presenting their results and InTech for open access publication.

Mehdi Khodaei
K. N. Toosi University of Technology,
Iran

Luca Petaccia
Elettra Sincrotrone Trieste,
Italy