Preface

This book is talking about how to use supercritical water (SCW) to rapidly produce micro- and nano-particles of metal oxides, inorganic salts, metals and organics. It covers basic principles, experimental methodologies and reactors, particle production, characterizations and applications as well as the recent advancement. Fine particles can be produced by both chemical and physical precipitation of products from SCW. They can be used as catalysts, materials in ceramics and electronic devices and composite materials. Particles are easily produced continuously in a flow reactor in short reaction times (0.4 s$\sim$2 min) but can also be synthesized in batch reactors for long reaction times (e.g., 12 h). They can be easily studied in-situ microscopically (optical/IR/Raman/SR-XRD) in an optical micro-reactor, diamond anvil cell. The size, size distribution, crystal growth & structure, and morphology of particles can be controlled by changing the concentrations of stating materials, pH, pressures, temperatures, heating & cooling rates, organic modifications, reducing or oxidizing atmospheres, flow rates and reaction times.

This is the first book to systematically introduce using SCW for production of fine particles. It is an ideal reference book for engineers, researchers and graduate students in material science and engineering.

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