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The special optical characteristics imparted by metallic nanoparticles have been used in producing colored glass ever since the 4th century AD, even though the craftsmen were unable to see the nanoparticles and thus explain the true character of metallic colloids. The first scientific evaluation of a colloid (gold) was done by Michael Faraday in 1857; he remarked that colloidal gold sols have properties different from bulk gold (Chapter 1, Table 1.2). The history of nanomaterials dates back to 1959, when Richard P. Feynman, a physicist at Cal Tech, forecasted the advent of nanomaterials. In one of his classes he stated that “there is plenty of room at the bottom” and suggested that scaling down to the nano-level and starting from the bottom-up was the key to future technologies and advances. The remarkable progress in characterizing nanoparticles and unravelling novel physical and chemical properties of nanoparticles has opened the possibility of new materials. Simple preparation methods using various techniques to produce high-quality nanoparticles are now available (Chapter 1, Figure 1.4), one of which is the use of microwave heating that has attracted considerable attention worldwide. Several books have been written mostly on microwave-assisted organic syntheses in the past decade, yet none have dealt specifically with microwaves and inorganic materials except perhaps in the use of microwave radiation in the sintering of ceramics. The latter notwithstanding, research in nanoparticle syntheses with microwaves has seen a remarkable growth in the last several years.

The main purpose of this book is to give an overview of nanoparticle synthesis using the microwave method, with the first chapter providing an introduction to nanoparticles followed by two other chapters that explain some of the fundamentals of microwave heating (Chapters 2 and 3). In the remaining chapters several specialists in the field describe some of the specifics and variations in nanoparticle synthesis. As the data available in the literature were enormous, we had to make the difficult choice of including only the most relevant and up-to-date literature; we apologize to the reader if we missed to include other worthwhile contributions. Prominent in the book are abundant chemical information and some beautiful TEM data that define the structural features of nanoparticles. We are thankful to all the contributors who have answered the call, and also to the Wiley-VCH editorial staff for their thorough and professional assistance. The data presented would not have been possible without the fruitful collaboration of many university and
industrial researchers, and not least without the cooperation of students whose names appear in many of the earlier publications. We are indeed very grateful for their effort.

We hope this book becomes a starting point for researchers in other fields to become interested in pursuing microwave chemistry, in general, and microwave-assisted nanoparticle syntheses, in particular.

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