

Preface

Nanotechnology has opened up a new area of research in different fields. Advantages are as many as to overcome disadvantages. The present collection intends to describe the applications of electron paramagnetic resonance (EPR) spectroscopy in the area of nanomaterial characterization. I have used all the three names in the title of the book for the technique, viz, electron magnetic resonance (EMR), electron paramagnetic resonance (EPR) and electron spin resonance (ESR). Logically EMR includes the terms EPR and ESR. Most of the available books on EPR generally involve mathematics and quantum mechanics. It poses a hurdle before the scientists from other disciplines. I have tried to avoid these mathematical details to make this collection more meaningful for readers from different disciplines.

This book contains two parts. First part deals with nanomaterials and their classification. Second part deals with EMR characterization of nanomaterials. Chapter “[Nanomaterials and their Classification](#)” by Cristina Buzea and Ivan Pacheco is an excellent attempt to acquaint the reader with the nanomaterials and highlights their physico-chemical properties. Chapter “[A Brief Manifestation of Nanotechnology](#)” by Sharda Sundaram Sanjay and Avinash C. Pandey complements Chapter “[Nanomaterials and their Classification](#)” and includes applications based classification. A section on magnetization dynamics of nanomaterials which is covered in this chapter provides a link to the second part on EMR characterization of nanomaterials. Chapter “[An Overview on Advances in the NanoCarriers Drug Delivery Systems](#)” by Anjana Pandey gives an overview of the recent trends of nanocarriers drug delivery systems which have attracted the attention of the scientific community due to several advantages over the conventional drug delivery systems.

Applications of EMR spectroscopy covered in second part of the book deal basically with two different categories of nanomaterials—metallic nanoparticles and metal oxide nanoparticles. Chapter “[EMR of Metallic Nanoparticles](#)” by Siavash Iravani deals with EMR of metallic nanoparticles. Chapter “[Electron Spin Resonance Applied to Nanosized-Doped Oxides](#)” by Cesare Oliva and Marco Scavini covers the ESR of nanosized doped oxides. Chapter “[EPR Studies of](#)

[Cerium Dioxide Nanoparticles](#)” by me and my co-author Rafail Rakhmatullin deals with recent EPR applications in the characterization of ceria nanoparticles. Most of this chapter is based on the research work of Rafail Rakhmatullin and co-workers. Chapter [“Synthesis and Characterization of Undoped and Doped \(Mn, Cu, Co\) ZnO Nanoparticles: An EPR Study”](#) by Seyda Colak and Cangul Akturk covers EPR of zinc oxide nanoparticles.

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In spite of our efforts, errors and omissions might have crept in. I request esteemed readers to bring these mistakes to our notice.

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