Preface

This book is motivated by the need for an introductory level material focusing on the optical properties of nanomaterials and related spectroscopic techniques for upper level undergraduate and beginning graduate students who are interested in learning about the subject matter. While there are a number of excellent books on the market covering different aspects of nanomaterials, to date, there has not been a single monograph that specifically covers optical properties, optical spectroscopy and applications of nanomaterials.

Since optical properties are a major aspect of nanomaterials for both fundamental and technological reasons, I believe an introductory book specifically devoted to this subject is necessary and should be useful to both beginners and practitioners in the fields of nanoscience and nanotechnology. The objective is not to provide a comprehensive coverage or a review of all the nanomaterials studied to date, but rather to cover the very basics and illustrate the important fundamental principles and useful techniques with examples from recent literature. Given the fast pace of growth in nanoscience and nanotechnology, it is impossible to be comprehensive or inclusive. However, effort has been made to include as many significant and current examples as possible.

While nanomaterials are sometimes quite broadly defined to include inorganic, organic, biological, and various composite materials that involve a combination of these materials, this book will focus primarily on inorganic nanomaterials of semiconductor, metal and insulator. Some examples of more complex structures, including composites, will be briefly covered.

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This book can be used as a textbook or used by students on their own as long as they have some basic knowledge of quantum chemistry and optical spectroscopy. I have strived to provide a balanced coverage of both the basic principles as well as related experimental optical techniques so that students can gain knowledge and skills that are practical and directly useful to them in their learning and research. I have also made a special effort to ensure that this book is relatively easy to read and follow and, if used for teaching, can be taught in roughly one quarter or semester. I have used many figures and illustrations to help the readability. A fair number of references, again not meant to be complete or comprehensive, are given wherever appropriate.

I welcome feedback from readers and will attempt to incorporate them in future editions of this book, if such an opportunity arises.

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