chapter of the book. Spanning over 90 pages (nearly a fifth of the book), this chapter contains the key ideas, concepts and models of strong correlation physics. The chapter starts off with a very lucid discussion of correlation strength and emergent energy scales, and goes on to discuss various key models from the Anderson model to the t–J model (including its relation to the Hubbard model) and explores important physics such as the Kondo effect, metal–insulator transitions, etc. The chapter is replete with many theoretical techniques such as projection methods, slave particle methods, etc. These have come to be mainstays of the field, and a graduate student using this book would benefit tremendously with a careful study of this chapter.

The remainder of the book is a survey of systems with strong electron correlations. Chapter 11 discusses correlated transition metals, including a very readable discussion of their magnetism. This is followed by transition metal oxides in chapter 12, which includes a discussion of the structures and phenomena in cuprates, manganites, etc. Heavy quasiparticles that emerge in Kondo lattice and charge ordered systems are covered in chapter 13. Moving on to even more exotic emergent phenomena in correlated systems, the author discusses excitations with fractional charges in chapter 14. Systems discussed include polyacetylene, fractional quantum Hall effect and frustrated systems. The final chapter of the book is on superconductivity. Though there is a brief discussion of the standard BCS theory, the author's heart is clearly in the exotic superconducting avatars and effects. The final section of this chapter and the book discusses high-temperature cuprate superconductors. This choice for the final section seems quite apt as cuprates have provided some of the most perplexing problems of correlated electron physics.

The book touches upon almost all standard aspects of strong correlation physics, including many of the theoretical techniques (both analytical/numerical) and covers a wide range of experimental phenomena; it is in this sense unique and indeed is a commendable effort by the author. This book will certainly be useful to a practising condensed matter physicist as it can serve as a ready reference for theoretical concepts/techniques and phenomena of electron correlations. However, a fresh graduate student might find it hard using the book as a standalone textbook to study correlation physics. While parts of the book are readable (e.g. chapter 10), developments in the later part are a bit fast-paced. For example, it will be quite difficult to use chapter 15 for an introduction to superconductivity. The book will be most useful to those students who have already had an introductory course on many-body physics, and it can then play the role of an advanced text. Furthermore, the presentation of some of the topics appears to be too brief – for instance, the composite fermion theory of fractional Hall effect which has been so successful in explaining experiments has not been discussed (even though there is a brief reference). Yet, there is no doubt this book will be useful to an advanced graduate student and will whet her appetite for further exploration of strong correlation physics. On the same token, the book will be a wonderful resource for scientists from other fields such as theoretical/solid-state chemistry, physicists working on ultracold atoms interested in simulating condensed matter systems, string theorists exploring condensed matter problems using the gauge–gravity correspondence, etc.

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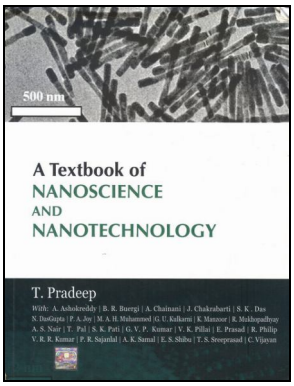
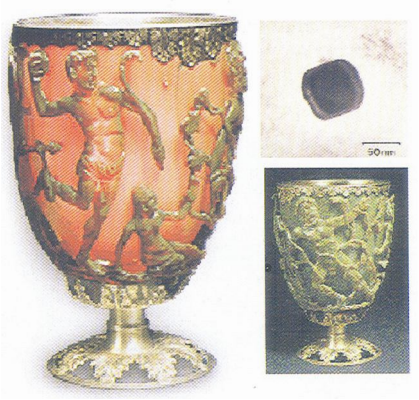


A Textbook of Nanoscience and Nanotechnology. T. Pradeep *et al.* Tata McGraw Hill, B-4, Sector 63, Noida 201 301. 2012. xxxiii + 949 pp. Price not mentioned.

During the past two decades, considerable research has been carried out in the field of nanoscience and nanotechnology. Nanomaterials of CdSe, CdSeS and CdSe/ZnS as white light-emitting phosphors, those of ZnO and SnO_2 as excellent gas sensors and photodetectors, doped carbon nanostructures as Pt-free catalysts for fuel cell applications, etc. have been developed that hold promise for potential applications. In addition, they are important for fundamental phenomena as well. For example, remarkable are the unique nanostructured materials such as carbon nanotubes that can be mechanically stronger than diamond and ferromagnetic materials exhibiting super paramagnetism when their size is reduced. Although several review articles and books on nanoscience and nanotechnology are available, the book under review has been designed to give a comprehensive understanding of the subject, starting from the fundamentals to application of nanostructures.

Synthesis of nanostructured materials is an integral part of nanoscience and nanotechnology. Similarly, characterization of nanostructures is of paramount importance. After giving a historical introduction to the subject, the book discusses the synthesis of various nanostructures using different techniques and various experimental tools to characterize them. A brief discussion on a variety of techniques such as scanning tunnelling spectroscopy, atomic force microscope and transmission electron microscope that allow us to probe the structure of matter with high spatial resolution, making it possible to see for instance individual atoms, has been presented. Techniques such as surface-enhanced Raman spectroscopy, electrochemical mass spectrometry, contact angle measurements, two/four probe conductivity measurements, zeta potential, etc. have also been discussed.

Several theoretical models with computational methods have been employed for understanding the nanoscale phenomena and novel properties of materials at nanoscale. One of the chapters is devoted to the theoretical understanding of nanostructured materials. The book also discusses advanced nanomaterials such as quantum clusters of gold that exhibit luminescence and magnetism in contrast with the bulk counterpart. The gold clusters are also chemically active and can be used as catalysts for oxidation and hydrogenation. Other advanced nanomaterials such as superlattices of



The Lycurgus Cup made of glass appears red in transmitted light and green in reflected light. The glass contains 70 nm particles as seen in the transmission electron micrograph. The cup itself is dated to 4th century AD, but the metallic holder is a later addition. (Source: http://www.thebritishmuseum.ac.uk.)

nanoparticles, dendritic nanostructures and hybrid systems have been discussed for the benefit of readers. Special attention has been drawn on a variety of topics, including molecular electronics, nanolithography, nanomagnetism, nanobiology, nanofluids for cooling technology, transition metal clusters catalysts, etc. Overall, the book has several commendable features and is informative. As this book is pedagogical in nature, I am sure it would stimulate more research and benefit the undergraduate teachers and students who are interested in nanoscience and nanotechnology. The strength of the book is that it introduces 15 experimental procedures that can be useful in designing an experimental course at the undergraduate level. Each chapter is provided with a few review questions that would help teachers and students to strengthen their understanding of the topic.

The authors have aimed at a wide spectrum of audience and have been successful to a greater extent. Above all, the classical as well as up-to-date references provide a source of valuable information to students and professionals in the field. Overall, I would strongly recommend this book to the libraries of all educational and R&D institutions, especially where undergraduate course on nanoscience and nanotechnology exists.

I have some general remarks: (a) the size-dependent properties such as optical, thermal, mechanical and thermodynamic properties should have been discussed explicitly, and (b) more emphasis should have been given to carbon nanostructures such as fullerene, carbon nanotubes, graphene and graphene quantum dots as well as other inorganic nanotubes.

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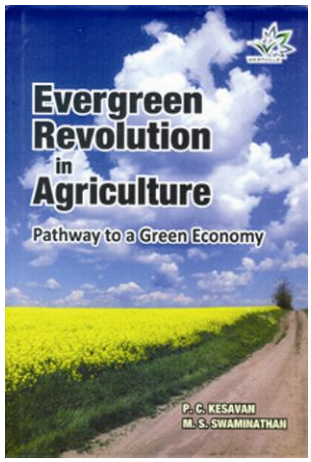

Evergreen Revolution in Agriculture: Pathway to a Green Economy. P. C. Kesavan and M. S. Swaminathan. Westville Publishing House, 47, B-5, Paschim Vihar, New Delhi 110 063. 2012. v + 139 pp. Price: Rs 695; US$ 30.00.

The book under review (with chapters 1–10) is an account of the widely known views of the authors about the concept of 'evergreen revolution' (which was proposed in mid-1990s) and its possible role in 'green economy' (a concept that was proposed more recently). At appropriate places throughout the book, the authors also describe and discuss the steps taken and the results obtained by M.S. Swaminathan Research Foundation (MSSRF) towards achieving the goals of evergreen revolution. The authors also emphasize throughout the book (which sometimes appears repetitive) that although green revolution provided food security and served a useful purpose, it has also caused tremendous harm to the environment and the ecosystem.

In chapter 1, the authors introduce the subject, giving a historical account of the steps taken globally towards sustainable development and the present needs of a shift from green revolution to evergreen revolution. Chapter 2 deals with the history of green revolution and its success, but with major emphasis on the consequent (but perhaps inevitable) environmental harm that green revolution has caused (they state that by 1990s, 'green revolution' turned into 'greed revolution'). Chapters 3–5 of the book are devoted to 'evergreen revolution' (sometimes also described as 'second green revolution'). Chapter 3 describes the basic concept of evergreen revolution and its comparison with green revolution, emphasizing the need of sustainable agriculture without environmental harm. Throughout this chapter, the authors discuss the harm done by green revolution (at the environmental, social and economic levels), including environmental degradation, poverty, burden on women in farming families, etc. They also state that MSSRF was established in 1988 in Chennai and the concept of evergreen revolution was put forward during 1990s to deal with this difficult situation. In chapter 4, an excellent account of five major ecological foundations of sustainable agriculture (land and soil, freshwater, biodiversity, renewable energy, atmosphere), on which evergreen revolution is based, has been presented, outlining the causes of environmental degradation due to intensive agriculture and other human activities, and the solutions that are possible. Chapter 5 describes the threats and challenges to evergreen revolution, which are real. Among the threats, besides population growth and exploitative (rather than sustainable) utilization of natural resources, recombinant technology is also described as a threat, although many, including the present reviewer, would disagree with this view.

Chapter 6 is devoted to agricultural arrangements needed for production and marketing of agricultural goods under the system of proposed evergreen revolution. These arrangements include cooperatives, farmers' associations, contact farming, small farm management and special agricultural zones, operation flood (linking farmers and consumers, as followed by dairy industry). Chapter 7 entitled 'Shaping the future of agriculture in an era of climate change' deals with the causes of climate change and its consequences. In this chapter, the authors