
Book Review

NANOTECHNOLOGY FUNDAMENTALS AND APPLICATIONS
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Dr. Mahipal Singh*

Dr. Madan Singh**

Nanotechnology is revolutionizing the world of materials and has emerged as a big growth area in this century. The rapidly growing applications of nanomaterials in various field require a good understanding of nanotechnology. The book provides an excellent introduction of Nanotechnology and the overview of its applications in various fields. The book provides an easy-to-read glimpse of application areas of nanotechnology.

The entire book has been classified into twelve chapters. The book begins with the general discussion on the introduction of nanotechnology. The first chapter on introduction presents good introduction of nanotechnology. The author has made the chapter easy to understand nanotechnology. The author has explained the need of nanotechnology in a good manner. The history of nanotechnology has been explained in detail. The book covers uses of nanotechnology in various fields- industry, environmental remediation, medicine, science, household etc. but the applications on hydrogen storage in carbon nanotubes (CNTs) property are not mentioned in the chapter. Carbon nanotubes (CNTs) show very surprising hydrogen storage capacity in spite of their relatively small surface area and pore volume. Although the applications

* Department of Physics, R.H. Govt. Post Graduate College, Kashipur (Uttarakhand)- 244713
India

** Department of Physics and Electronics, National University of Lesotho, Roma, Lesotho,
South Africa

on this property have been covered separately in fifth chapter but first chapter would be the proper place for this.

In the second chapter “Tools and Techniques”, the author has tried to present the various techniques used in nanotechnology but detailed techniques with suitable diagrams are lacking in the chapter since this chapter is the heart of the book. In the third chapter, the author has dealt with the properties of nanomaterials and methods to produce nanomaterials. The properties of these materials should be described in details. The inclusion of mechanical and thermoelastic properties of nanomaterials is necessary in the description. The author has described carbon nanotubes (CNTs), methods to produce nanotubes, properties of carbon nanotubes (CNTs) and their applications in various fields. The author should have mentioned the properties of CNTs in detail. The other important and major properties of CNTs such as field emission properties etc. have not been described in the chapter since nanotubes exhibit unique physical and chemical properties as being a quasi-one dimensional material. The description of all these properties should be there. Similarly, other possible applications of CNTs have not been described by the author. CNTs show very surprising hydrogen storage capacity. Due to this capacity, CNTs have important applications.

Potential risks of nanotechnology have been presented in chapter 4. More importantly, the chapter also discusses health and environmental impact of nanomaterials. In chapter 5, the contribution of carbon nanotubes (CNTs) to hydrogen storage has been elaborated in a very good manner which was not given in previous chapters. This chapter has been designed especially on the hydrogen storage capacity of CNTs. Very important applications of nanotechnology in solar power have been presented with sufficient detail in chapter 6. It has been discussed that nanotechnology might give plastic solar cells. There are CNTs to improve solar cells. Very good discussion on solar power using nanotechnology has been given in this chapter.

The seventh chapter provides an easy-to-read glimpse of applications of nanotechnology in textile industry. Commercial potential of nanotechnology for textile industry has been described in the chapter. Several methods to apply coating onto fabrics, well known properties (water repellence, UV-protection, anti-bacteria, antistatic, wrinkle resistance) imparted by nano-treatment and nanotechnology textile developments have been discussed in a good manner.

Textiles in contact with skin offer optimum conditions for the growth of most organism. Therefore, antimicrobial coatings are extremely important for textiles. The chapter does not report in detail the strategies and method for antimicrobial coatings. The importance and application of UV protective coating has also been covered in the same chapter. The rapidly growing applications of nanomaterials in textiles require a good understanding of their preparation techniques, characterization methods and the structure property correlations. This is especially needed because textiles are organic polymeric materials with low thermal stability and require an application/treatment procedure different from what is used for metals and ceramics. Nanosols preparation is an important technique for the creation of nanoparticles. The chapter does not provide introduction of nanosols and overview of their applications in textiles. The use of nanosols modifies textile surfaces in order to improve mechanical and thermal stability, repellent properties, optical properties, antistatic coatings and bioactive coatings. The chapter is disappointing in that it does not cover anything about nanosols. The chapter ends very abruptly.

The chapter 8 highlights the introduction to nanocomposites, applications of nanocomposites, clay-nylon nanocomposites, polymer nanocomposites, development of nanocomposite characterization techniques in a beautiful way. Proposed types of nanocomputers have been presented with sufficient detail in chapter 9. The author has made an attempt to bring out the hopes involved.

In tenth chapter, the author has presented the possibilities of nanotechnology for space exploration. Some specific benefits that nanotechnology would bring have been discussed in the chapter. The importance of CNTs in space has been discussed. Carbon nanotubes (CNTs) can enable us to build the space elevator and quickly move into space. The same material could reduce the mass required for the lifting equipment on a space elevator and also lighten solar power satellites and space stations. A beautiful discussion on new breed of robots to explore the planets has been given in this chapter.

In the eleventh chapter, the author has dealt with the applications of nanotechnology in communications. Nanotechnology plays a vital role in communications. In the chapter, the author has discussed the advantages of nanomaterials over traditional materials in communications.

The twelfth and last chapter on Nanoelectronics highlights the aim of nanoelectronics, current research areas, major issues, major problems, making of nanoelectronics devices in a very systematic manner. The fundamental message of this chapter is that nanoelectronics is a wide open field with vast potential for breakthroughs coming from fundamental research. The author has described Micro Electro Mechanical Systems (MEMS), uses of MEMS, MEMS fabrication for atom chips, Nano Electro Mechanical Systems (NEMS), the future of NEMS, limitations of NEMS etc. The author has also tried to throw light on bioelectronics which is a rapidly advancing, multi-disciplinary research field at the interface of the life, sciences, physics, engineering and chemistry. The author has written on bio-nano devices, bionanomaterials, microfluidics, cell and particle manipulation methods, microanalytical devices, optical biosensing, modeling and theoretical work only as introduction. These are very important current research. The author should explain these in details. The author has not presented fundamental concepts of nanoelectronics in the chapter. The author may start the chapter with the observations of Gordon Moore of 1965. This would benefit the readers.

In the summary, this book deals with major concepts related to nanotechnology and its applications in various fields. Altogether the text is comprehensive and could provide an appreciation and understanding of nanotechnology and nanomaterials. The objective of the book-to introduce the emerging field of nanotechnology to the students of science and technology and provide the reader basic knowledge of nanotechnology and its various applications seems to be achieved. It is suggested to include the following informations in the revised edition, if published, of this book-

- References used
- Nanoparticle size determination
- Nanosols, as nanosols preparation is an important technique for the creation of nanoparticles

These would enhance the effectiveness of the book.