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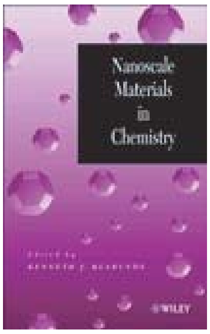
What Do Old Stained-Glass Windows and One of the World's Most Exciting New Areas of Science Have in Common?

*Joe Shapter**



Nanoscale Materials in Chemistry

Kenneth J. Klabunde (Ed.)

John–Wiley & Sons, Inc., Chichester
September 2001, 304 pp.
ISBN 0 471 38395 3
Hardcover, 74.50 GBP

This book examines some of the new, exciting developments resulting from the controlled production of materials in the size range 1–10 nm. The structure is that of a series of chapters from authors in fields related to nanoparticle science and is aimed at a reader with a high level of scientific background. It would be ideal for graduate students in the field or closely related fields as it covers a range of material types and subject areas.

Nanoscale materials in this book are defined as nanoparticles. There is little or no discussion of other nanoscale developments such as quantum dots or nanotubes. This is a fair approach as the field of nanoparticles is the oldest and, without a doubt, the best-developed field of nanoscience as illustrated in many of the examples presented. Indeed the point is made that nanoparticles have been in use for centuries in the colouring of stained-glass windows. Faraday did the first scientific studies in the area and some of his methods are still in use today.

The book starts with a great introduction to why 'things' on the nanoscale are of interest. This relates to all the exciting possibilities that nanotechnology promises for the future. The point is also made that nanoscale science is neither chemistry nor physics. This is an important point, as an understanding of science on this size scale requires a solid grounding in both areas. The remainder of the book is split into two sections. The first section discusses the basics of nanoparticles of all types—metals, semiconductors, and insulators. In all cases, both experimental details of and the theoretical basis for many of the features observed on the nanoscale are discussed. The second part of the book presents the practical applications, mostly current, of the properties from the first section.

The first section of the book is, for the most part, presented with many experimental examples and the coverage of possible methods of fabrication is excellent. For example, the relatively new use of reverse micellar solutions to make nanoparticles with narrow size distributions is presented in some detail. In some cases, there is further discussion of the use of nanoparticles to make array structures of one form or another. This is a key step in making this nanoscience into useful technology. This aspect of the development of this science is missing in some of the sections. The optical and magnetic properties of nanoparticles are covered in some detail. The magnetic section presents a nice discussion of basic magnetic properties but the relationship to nanoscale magnetic properties is weak at best and this chapter is somewhat out of place in this book. The discussion of catalytic chemistry and special opportunities presented by using nanoscale materials is excellent. This is the section of most use to the chemical community. The small final chapter returns to some of the current applications presented in the introduction and is undoubtedly where the real excitement and potential in the field lies.

This book is an excellent discussion of the current state of nanoparticle science development. It is presented in a clear fashion at quite a high level. With the one exception of the magnetic properties, the coverage of the field is excellent with many examples of present applications. There is little speculation about some of the future possibilities, which seems a bit of a missed opportunity. However, this is an excellent book with plenty of detail and further references in the area of nanoparticles. For people with an interest in the area, it is well worth a look.

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