hand, nanites are systems that are associated with active applications of nanotechnology; for example, information is actively transferred into a particular nanoscale system or between a nanoscale system and its surroundings.

The book generally avoids mathematical expressions, thus making it more readable for those working in materials science or those with general interest in nanotechnology. The field of nanotechnology is spreading fast with burgeoning demand for documented information, and this book will thus draw attention in the market.

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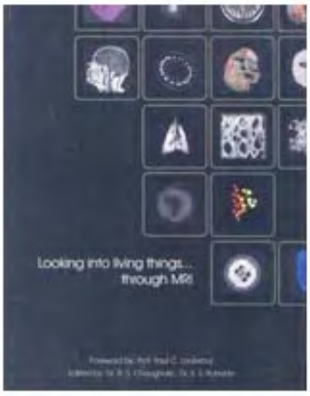

Looking into Living Things….through MRI. R. S. Chaughule and S. S. Ranade (eds). Prism Publications, 1514 Shivpuri, Sion Trombay Road, Chembur, Mumbai 2007. 341 pp. Price: Rs 1350.

Magnetic Resonance Imaging or MRI is a technique well-known, beyond the scientific community, even to the common man because of its widespread use in hospitals. It is therefore invariably associated with imaging human anatomy and with disease detection. That the technique is extensively used in a number of other areas such as plant science, food technology and material science is not that well-known. This book serves the purpose of bridging the gap in knowledge in this regard. It is a compilation of 19 articles on the application of MRI to a variety of systems mainly related to plants and food. There are also a few articles pertaining to human imaging and some on methodology which have been contributed by several authors from laboratories across the globe. The book also carries a foreword by the Nobel Laureate Dr Paul C. Lauterbur, inventor of MRI, who passed away recently. The articles provide interesting reading and cover topics such as study of fruits, wine grapes and wood, and measurement of quality of food items like bread, meat, ham, seafood and so on. Clinical applications include topics such as the study of pancreas, application to cancer detection and MRI of lung. There is also an interesting work reported on functional MRI of plants, which studies how water flow in the stem of the plants is affected by an external stimulus namely switching on and switching off of light near the plant.

MRI as a technique has undergone rapid development and is now able to provide detailed images with a resolution of the order of a millimetre in the case of whole-body imaging used in hospitals to a few microns in the case of laboratory mini- and micro-imaging machines. As a result, minute changes occurring deep inside the system under investigation can be easily identified. This is the basis of disease detection in human beings and quality measurements in food items. The images provide detailed information on the structure of the object under study. It is also possible to make flow measurements using MRI. Thus, the ascent of water from the roots of plants upwards through the xylem as well as the downward flow of assimilates produced by photosynthesis in the leaves through the phloem can be imaged simultaneously and studied. Another major advantage of MRI is that it is non-invasive and non-destructive. Therefore it allows viewing cross-sections of the specimen from different directions which is not possible in the case of invasive techniques. Also, repeated examination of the specimen over a period of time is possible. Thus temporal changes such as the spread of infection in fruits, fermentation of bread dough, drying processes in wood, ripening process of ham, etc. can be monitored in fine detail.

Two factors which are unfavourable for MRI for use in an assembly line are the relatively slow speed of imaging an entire object and the bulkiness of the apparatus. Applications reported in this book indicate developments that will propel the technique eventually towards such use.

In addition to imaging, localized spectroscopy called Magnetic Resonance Spectroscopy or MRS is also a very useful technique for disease detection and its application for detection of cancer has been illustrated. Generally proton is the choice of nucleus for MRI investigations. However imaging and spectroscopic studies using other nuclei are not rare. This is illustrated in the article on the use of lithium for the study of mammalian systems. The articles also contain application of MRI to such interesting areas as developmental biology, anatomical changes during embryonic development, cell tracking, etc. The book under review clearly shows that MRI has developed into a truly multi-disciplinary science with physicists, chemists, material scientists, clinicians, biologists, botanists, bioengineers and other scientists coming together and inventing new areas of applications of MRI.

Overall, the book makes interesting reading and will be highly useful for scientists to learn the different directions in which MRI can be applied. While there is a surfeit of books on clinical applications of MRI, there is hardly any book that covers other applications. Thus, this book is both timely and appropriate.

A few words about the format and production of the book need to be mentioned. It would have been better had more attention been given to the arrangement of articles. Thus, it would help an uninitiated reader to start with an introduction to MRI. Article 12 in the book attempts to do so, but it is in the wrong place, and could have been better presented in terms of content and accuracy. Several articles seem to have been published just as submitted by the authors without bringing them to the book format. Thus, in several cases the figures and tables are at the end of the article and not at appropriate places in the text. Also, not enough care has been taken to obtain good figures with clearly legible legends. As a result, the description of the figure is left to be guessed by the reader. There are also many glaring typos which make the reading difficult. However, if one overlooks these minor difficulties, the book is a welcome addition to the useful area of application of MRI.

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