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# BOOK REVIEWS

**Transition Ion Electron Paramagnetic Resonance.** By J. R. PILBROW. Oxford University Press, New York, 1991. xx + 717 pp. $195.00.

Intended as an introductory text on transition ion EPR at the beginning graduate student level, this book seeks to bring this subject matter to an audience that Abragam and Bleaney's comprehensive treatise "Electron Paramagnetic Resonance of Transition Ions" (Oxford Univ. Press, Oxford (1970)) was never able (nor perhaps intended) to reach. The author has succeeded admirably.

The book restricts itself to a discussion of paramagnetic ions of the first three transition series. The author commences with an overview of transition ion EPR, including the two-level system, orientational dependencies, spectral response, and spectrometer principles, and then cites several representative examples of single crystal and powder EPR spectra. In subsequent chapters the author unfolds understandable, detailed discussions of crystal and ligand field effects on EPR spectra, spin Hamiltonian solutions of *d*-electron configurations via perturbation theory methods, experimental methodology of CW-EPR, linewidth analyses, and computer simulations of single crystal, powder, and partially ordered systems, and paramagnetic relaxation. Throughout the text the figures are handsomely displayed and annotated. Spectral traces are frequently augmented with energy level diagrams to clarify discussion. The book is primarily concerned with CW-EPR, but short chapters on double resonance (ENDOR and ENDOR-induced EPR), pulsed methods (ESEEM and LEFE), and zero-field EPR (ZRF) can also be found. Most of the examples in the text deal with magnetically dilute paramagnetic centers. However, coupled systems are treated in a separate chapter that focuses primarily on interactions between pairs. A lengthy descriptive chapter on biological applications of transition-ion EPR is also included.

The basic philosophical approach of the book is to treat the magnetic parameters which characterize an observed EPR spectrum as only part of the model of the paramagnetic system. Whereas the solutions to numerous spin Hamiltonians are given prominent coverage, significant attention is also paid to the factors controlling linewidths of EPR transitions. Taken together these provide a complete characterization of the transition ion under scrutiny. With the development of efficient EPR spectral simulation algorithms for sophisticated analysis, computer modeling of the observed lineshapes, discussed at length in this book, has become possible for even the most casual observer of EPR spectra. For them and for any researcher in the field of EPR spectroscopy, this book will be valuable.

However, despite its number of positive attributes, it is doubtful that this book will ever find its intended niche as a required text in a matriculating graduate course on EPR, toting as it does, a hefty price tag.

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**Scanning Force Microscopy; with Applications to Electric, Magnetic, and Atomic Forces.** By DROR SARID. Oxford University Press, New York, 1991. xi + 254 pp. $45.

The invention of the scanning tunneling microscope by Binnig and Rohrer over 10 years ago has significantly influenced many aspects of materials science. Applications include atom-by-atom analysis of chemisorbed species on clean, crystalline surfaces in UHV and electrochemical environments, investigation of grain morphology in thin films (e.g., high-temperature superconductors), studies of molecular aggregation in liquid crystals and in biological systems, and measurement of nanometer- to micrometer-sized patterns of practical importance in the electronics industry. The invention of the atomic force microscope by Binnig, Gerber, and Quate in 1986 opened similar applications in a broader range of materials, now including electrical insulators. Scanning tunneling and atomic force microscopes are sold commercially and can be found in hundreds of laboratories around the world, but scanning force mi-



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