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BOOK REVIEW

Rudolf Holze

E. Smith and G. Dent (eds): Modern Raman spectroscopy — a practical approach

Wiley, Chichester, United Kingdom, 2005, 210 + XI p., 24.95 £; ISBN 0471497940

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At first glance the reader might be surprised and left wondering why a book on Raman spectroscopy is reviewed here. Only a few pages later into this book he will realize the twofold relationship to readers of this journal. Various Raman spectroscopies enjoy considerable use in the electrochemical community. Beyond surface-enhanced Raman spectroscopy and several variants of this method numerous other applications of the Raman effect in particular in combination with confocal optics are of increasing importance for spatially resolved in situ investigations of buried interfaces i.e. the solution/metal interface.

Nevertheless the use of lasers as well as the application of various other optical components somewhat away from the daily life of an electrochemist may pose particular problems especially for the novice. This book will help to overcome most of these obstacles. Contrary to many other introductory textbooks on spectroscopy this volume jumps straight into the middle of practical applications. Some words are spent on the historical background—and a few lines later the reader studies the first Raman spectrum. This brief introductory chapter is followed by an extensive treatment of all conceivable practical aspects. Choice of instrument, selection of suitable light source (laser type), sample preparation and positioning and several other topics are covered. The need for calibration is pointed out—together with the assumption, that many users tend to overlook this rather unspectacular task. At this point some reader might expect a discussion of resolution: how to achieve, how to test, how to improve. Although the electrochemist will usually encounter bands being rather broad because of interaction of the scattering species with the supporting electrode surface and the surrounding electrolyte solution, this topic is a must for a textbook on Raman spectroscopy.

R. Holze
Institut fuer Chemie,
Technische Universitaet Chemnitz,
09107 Chemnitz, Germany
E-mail: rudolf.holze@chemie.tu-chemnitz.de

The next chapter treats the theory of Raman spectroscopy. It takes into account quantum mechanics, but even readers with only basic knowledge in this area will have no problem in understanding this introduction. Resonance Raman scattering as a special case where real electronic states (instead of virtual ones) are involved in the scattering process is treated in the following chapter separately. A quite extensive discussion of surface enhancement (without and with additional resonance enhancement) is presented in a longer chapter containing numerous examples. Some of them are already dated, but they illustrate the discussion quite nicely. The electrochemist will find this chapter particularly instructive. Even hyper Raman scattering is mentioned—although in a separate chapter on advanced methods (including spatially resolved measurements) and special effects at the end of the book. In between a long chapter is devoted to all kinds of applications ranging from fundamental structural investigations in inorganic chemistry and materials science to online process control in the chemical industry.

The book is well written, the pleasure of reading is supported by numerous illustrations (both drawings and photographs) of actual samples and instrumentation. Many illustrations have been taken from original sources sometimes with considerable loss in quality and appearance. To keep the integrity of the original the authors have intentionally refused to redraw figures, in some cases this seems to be an imperfect decision. Only sometimes strange statements have escaped the authors attention: on page 3, the absorption is associated with a loss of frequency—but certainly the authors wanted to say otherwise—a loss of intensity at this frequency. The missing discussion of resolution has already been mentioned. Minor flukes like these should keep no prospective user of Raman spectroscopy from consulting this book, and certainly the electrochemist considering the use of these powerful spectroscopic as well as microscopic tools should be among the interested reader.