Handbook of Raman Spectroscopy. From the Research Laboratory to the Process Line. Edited by *Ian R. Lewis* and *Howell G. M. Edwards.* Marcel Dekker, New York 2001. 1090 pp., hardcover $ 225.00.—ISBN 0-8247-0557-2

Almost 75 years after its discovery in Calcutta in 1928, the Raman effect is showing a remarkable many-sidedness that C. V. Raman could certainly not have thought possible. For about 40 years this method based on inelastic light scattering remained a rather esoteric art, practiced by a few very specialized physical or physicochemical laboratories engaged in fundamental research. Nobody then could have seriously imagined that this spectroscopic technique might be used, for example, as a routine analytical method for process monitoring or materials characterization. At that time the laboratory scene was dominated by mercury vapor lamps as sources, cumbersome spectrometers, and photographic plate detectors that were sensitized using jealously guarded secret recipes, but which nevertheless required exposure times of hours or even days.

The rapid instrumental and scientific developments of the following 35 years have radically changed that picture. This revolution was introduced by the arrival of the first lasers, since these, in particular gas lasers and ion lasers, were soon shown to be ideal monochromatic sources for light scattering experiments. Nowadays lasers emitting wavelengths extending from the ultraviolet to the near infrared can be used. In particular, compact semiconductor lasers and neodymium-YAG lasers can be tuned for specific applications.

With regard to detection sensitivity, new types of spectrometers have been developed to meet the demands of the changed situation (e.g., with double and triple monochromators of high light efficiency), and with highly sensitive photomultiplier detectors only minutes are needed to record a high-resolution spectrum.

A second revolution occurred about 15 years ago with the introduction of highly sensitive cooled CCD (charge-coupled device) detectors with large surface areas. Instead of recording a spectrum sequentially, as with a photomultiplier detector, these measure many spectral elements simultaneously, greatly reducing the time needed. Moreover, these detectors come close to achieving the ideal detection sensitivity corresponding to an extremely low noise level. Thus, as well as an ideal light source, one now also has an (almost) ideal detector.

The poor detection sensitivity that used to be cited as a serious disadvantage of Raman spectroscopy has now been largely remedied, by advances in the technique of resonance Raman spectroscopy and by new forms of Raman spectroscopy making use of various nonlinear electronic effects. Today it is even possible, under favorable conditions, to detect single molecules by Raman spectroscopy, thus far exceeding the sensitivity of IR spectroscopy, with which it is often in competition.

The range of applications of Raman spectroscopy has also been extended by several other important recent developments, such as Raman microscopy, which makes it possible to study extremely small samples. One can also analyze the surface of an extended inhomogeneous sample, either by using confocal microscopy to obtain very high spatial resolution, or by scanning across a surface using glass fibers. It is also possible to use specially developed interference filters or holographic notch filters in certain applications as an alternative to a dispersing spectrometer, provided that one suppresses the fluorescence that would otherwise interfere with the measurements. An important separate development is that of Raman spectrometers based on the interferometric principle, which generate a spectrum by Fourier transformation.

All these techniques are described in the book by authors with outstanding knowledge and experience. The compilation is an impressive and wide-ranging survey of the current state of development. It is especially suitable for nonspecialists (i.e., scientists with little previous knowledge of the fundamentals of this special spectroscopic method), who might, for example, wish to be able to choose the most appropriate analytical method from several competing alternatives to solve a particular problem, or who need an overview of the applications of Raman methods in a specific area. This rapidly growing and increasingly varied circle of potential users will find in these 26 articles valuable information and guidance for reaching decisions. Trends in Raman spectroscopy and likely future developments are discussed (e.g., the development of spectrometers and detectors for very specialized applications, software for automatic interpretation of spectra, libraries of spectral data). The comprehensive lists of literature references included with each article are an especially valuable resource, enabling the reader to dig more deeply into the topics discussed.

The articles can be roughly classified under the following categories: theoretical and experimental fundamentals of Raman spectroscopy; "state-of-the-art" techniques of Raman spectroscopy; examples of applications of the Raman method in current research, in areas such as insulators, microstructure of semiconductors of Groups II–VI, glasses, biology, medicine, chemical analysis, catalyst research, gases; applications in process control and quality control, e.g., of diamond-like surface coatings used in the production of computer hard disks and read–write heads; applications in special areas such as forensic science, art history, restoration of works of art, academic teaching.

I have slight criticisms, mainly subjective, about a few of the articles and about topics that are not covered, but these are insignificant compared with the book's many virtues. It is well worth buying.

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Handbook on Metalloproteins. Editored by *Ivano Bertini, Astrid Sigel,* and *Helmut Sigel.* Marcel Dekker, New York 2001. xxvii + 1182 pp., hardcover $ 265.00.—ISBN 0-8247-0520-3

Since the Reviewer received a copy of the „Handbook on Metalloproteins", he has consulted it countless times. There is no doubt that in this booming research area of chemistry, an overview was urgently required and eagerly awaited.

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