

BOOK REVIEW

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A Review of Electron Microscopy in Forensic, Occupational and Environmental Health Sciences

REFERENCE: Basu, S. and Millette, J. R., *Electron Microscopy in Forensic, Occupational and Environmental Health Sciences*, Plenum Press, 233 Spring St., New York, NY 10013, 1986, 285 pp.

This book represents a collection of articles based on presentations by the various authors at the Forensic, Occupational and Environmental Health Sciences Symposium, held as part of the 1985 joint national meetings of the Electron Microscopy Society of America and Microbeam Analysis Society. As such, the book is comprised of 16 different articles by 13 different authors or groups of authors. Extended abstracts of the presentations were previously published by San Francisco Press under the title *Proceedings-Electron Microscopy of Society of America, Forty-Third Annual Meeting*.

The articles in this collection are based on the expanded abstracts and show an extreme range in the amount of "expansion." Some of the articles assume a great deal of familiarity with the techniques on the part of the reader, while others offer a more thorough discussion of the techniques at hand and their application. Because of this uneven treatment of the topics, the contents of this book (with a couple of exceptions) are of use mostly to experienced laboratory personnel.

The articles are separated into three sections: Forensic Sciences, Occupational Health, and Environmental Health. The Forensic Science section includes articles on gunshot residue deposition and interpretation, bulb and filament failure in accidents, hair comparisons by elemental methods, tool marks, staples and bite mark analysis by scanning electron microscopy (SEM), and topographical mapping by SEM. The Occupational Health section includes asbestos measurement in the workplace, particle size determination in quartz dust from coal mines (a cause for black lung), the detection of nickel in the myocardium as an indicator of cardiomyopathy, and particulate contents of "nondiseased" urban lungs. The Environmental Health section includes articles on tissue preparation by modified cryoultramicrotomy, analysis of airborne lead particles in an industrial urban environment, X-ray microanalysis of subcellular ions in relation to hepatotoxicity, and identifying acid rain sources by characterization of the particulates.

The article in the Forensic Science section on filament failure is one of the exceptions noted above. This article is an excellent discussion of the theory of filament function and failure. It makes an excellent primer for students or personnel experienced in these examina-

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tions. The article on gunshot residue deposition (much of which has appeared in previous publications) however, requires an experienced analyst who can evaluate the data and the author's conclusions on his own. An inexperienced analyst might be misled by the apparent "ease" with which the author interprets his findings for reconstruction purposes. Similarly, the articles on hair examination, by two different elemental methods, require experienced, critical evaluation, not simple application.

In the Occupational Health section, the article on asbestos measurement gives a thorough presentation of some of the methods and limitations which must be faced in both the sampling and analysis for asbestos in workplace atmospheres. The other articles in this section do not offer quite as thorough discussions, but represent fairly direct applications of EM microanalysis of particulates. The article on quartz dust reevaluates the use of certain reference standards. The one on lung particulates begins to offer "baseline" information of "normal" lungs. And the other article demonstrates a new technique for the subcellular localization of nickel in tissue.

The Environmental Health section offers a good article on the use of automated scanning electron microscopy-energy-dispersive X-ray (SEM-EDX) analysis of particulates, and the application of current software enhancements to assist in the process. The article on measurement of subcellular ions for evidence of hepatotoxicity, however, is a brief expansion of the abstract and relies heavily on the reader's familiarity with the topic. The final article in this section uses morphology and elemental composition of particles to try to identify the precursors of the acid rain reaching New York. This data combined with backward, meteorologic air trajectories indicates a Midwestern source.

Overall, this book provides descriptions of ongoing and proposed development in the applications of electron microscopy to forensic science, occupational health, and environmental health fields for experienced scientists. As such, it could provide a valuable resource for laboratory personnel. For students or nonscientists, most of this book would be incomplete, and at points misleading. All of the articles are clearly presented and many offer fairly complete bibliographies. This work presents an interesting survey of the very natural marriage between these three disciplines and their overlapping methods and interests.