book but rather a thorough review of state-of-the-art applications of STM to important scientific issues. In fact it may have been more appropriate to title the book *Applications of STM.* The applications considered exemplify STM's ability to provide atomically resolved images that impart new insights to the structural and electronic properties of surfaces and even bulk materials such as layered materials and superconductors.

Although most of the book deals with important topical issues, there is sufficient introductory material for beginners. For example, several of the experimental artifacts encountered with STM, including giant corrugations and multiple tip images for graphite, are discussed and interpreted. All the contributing authors do an excellent job of discussing the work in their subfields, not just their own research. Thus, one of the strongest attributes of *Scanning Tunneling Microscopy I* is that it provides a rather full overview of key STM work along with references. It will be a very useful source for those new to the field, and for experts wanting to track down a specific work relevant to their own studies.

Generally, the references appear to be correct, but in chapter 3 references to the figures are mislabeled. This is not a major problem as it is the type of error that one catches and corrects. The index, while not exhaustive, does a good job of providing a way to locate key papers and subjects.

The topics considered are well balanced and in my opinion cover some of today's most interesting and exciting areas of research with STM. These include:

▷ A brief phenomenological description of what STM is and how it works, written by the editors.

▷ A short historical perspective written by Heinrich Rohrer, who with Gerd Binnig developed STM in the early 1980s; both shared a Nobel Prize in 1986 with Ernst Ruska, who contributed to the development of the electron microscope.

▷ STM studies of clean metal surfaces, by Yung Kuk.

▷ The application of STM to study adsorbate-covered metal surfaces and reactions on metal surfaces, by Joost Wintterlin and Jurgen Behm.

▷ STM studies of semiconductor surfaces by Bob Hamers.

▷ The study of layered materials with STM, by Roland Wiesendanger and Dario Anselmetti.

▷ The imaging of molecules with STM, by Shirley Chiang.

▷ STM studies of superconductor surfaces, by Jan van Bentum and H. van Kempen.

These chapters reflect key areas of interest within the surface science community as well as unique and current areas in condensed matter physics. There is clearly a focus on applications where atomic-level resolution is central and is exploited to resolve the physical property of the system and the phenomenon in question.

There is some duplication of material between chapters. For example, STM images of high-T_c superconductors are discussed in both the layered-materials and superconductivity sections. Topics such as electrochemical STM studies are only briefly mentioned in the section on metal surfaces and warrant more detail. Similarly, the application of STM to biological systems, also a very active field, is not discussed. Fear not, readers, for the second volume of this series is to include electrochemistry, biology, nanoscale surface modification and other nanoprobes related to STM techniques, and a third volume is planned to provide the detailed theory of STM and other related proximity probes.

One problem is that the large amount of material and marvelous images presented may leave the reader feeling that taking such atomic images is rather straightforward. Nonetheless, we practitioners recognize the months of painstaking effort and tedious work that go into each image!

Overall, the editors have done an excellent job in pulling together and organizing what will be a useful reference for STM workers.

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The Laboratory Handbook of Materials, Equipment, and Technique

Gary S. Coyne
Prentice Hall, Englewood Cliffs, N. J., 1992. 468 pp.
$45.00 hc ISBN 0-13-126228-9

The word "handbook" in the title *The Laboratory Handbook of Materials, Equipment, and Technique* may be somewhat misleading. This book is not a compilation of figures and tables, but rather a "how-to" guide, written in a personalized, in-

formative style.

Gary S. Coyne is a scientific glassblower employed by the California State University, Los Angeles, chemistry department, and his book strongly reflects that background. Thus, the chapter "Materials in the Lab" covers glass, flexible tubing, corks and o-rings. Then there is a chapter devoted to "Joints, Stopcocks and Glass Tubing," and one entitled "Cleaning Glassware." Under the heading "Measurement," the author's chemistry connection leads to an emphasis on weight and mass (balances) and volume (graduated cylinders, volumetric flasks, pipettes and burettes).

The above mentioned material accounts for about half of the book. Given the intended audience, primarily workers in chemistry laboratories, this is neither surprising nor misguided. However, that same audience should also be made aware of certain other common practices and equipment they can encounter in other laboratories. Let me give some examples.

In a subchapter on low temperature—restricted to the range above liquid nitrogen temperature, 77 K—the book offers a detailed discussion of glass Dewars, but only a one-sentence mention of *stainless steel* Dewars, which hardly does justice to the preeminent position of the latter as storage containers and research cryostats. Many versions of these cryostats incorporate variable-temperature inserts, complete with thermometers and temperature controllers. Such systems are much more convenient and safer to use than the constant temperature fixed points available from low-melting-point liquids kept in a partially frozen (slush) state. While I was impressed with the nearly 100 slush bath temperatures presented in a table, the significance of these devices is now greatly reduced.

As for the measurement of temperature, I do not fault the author's treatment of thermocouples. However, the widely used silicon diodes, thermistors and platinum resistance thermometers should have been covered as well. The discussion of PRTs is limited to the "standard" PRT, a device almost entirely restricted to use in standards laboratories. It is the much smaller, much less expensive but still reliable and reasonably accurate *industrial* PRT that should have been featured.

The chapter "Vacuum Systems" is well-written, but there are a few anachronisms, such as the discussion of liquid manometers and McLeod gauges. Although these devices may have pedagogical value, they lack the technological importance of, say, modern capacitance manometers.

Are there other books of this type? I am familiar with two. Fred Rosebury's *Handbook of Electron Tube and Vacuum Techniques,* which first appeared in 1964 and has now been republished by the American Institute of Physics, for many years has been the volume of choice for information on a variety of the specialized materials associated with glass technology. The second edition of *Building Scientific Apparatus*, by John H. Moore, Christopher C. Davis and Michael A. Coplan (Addison-Wesley, Redwood City, Calif., 1989) is intended for a broader audience than Coyne's book. In addition to material on glassworking and vacuum technology, it also includes sections on optics and electronic devices, cir-

cuits and instruments.

Here, then, are three books that describe how and why things are done in the lab. I believe Coyne's book is best suited for students and their supervisors in secondary school and undergraduate science laboratories, and there are undoubtedly others who will find useful tidbits in the book. Do you know why Teflon tape, as opposed to a sealant paste containing Teflon, should not be used on pipe threads in a vacuum system? Or why oxygen-free high-conductivity (OFHC) copper should be used as gasket material? See Gary Coynes's book for the answers.

For those working at national, industrial and university research laboratories, I recommend that at least one but preferably all three of the above-mentioned books be made available at a convenient location in the lab.

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NEW BOOKS

Theory and Mathematical Methods

Lie Groups and Lie Algebras I. *Encyclopedia of Mathematical Sciences, Vol. 20.* A. L. Onishchik, ed. (Translated from the Russian by A. Kozlowski). Springer-Verlag, New York, 1993. 235 pp. $89.00 *hc* ISBN 0-387-18697-2.

The Many-Body Problem: An Encyclopedia of Exactly Solved Models in One Dimension. D. C. Mattis, ed. World Scientific, River Edge, N.J., 1993. 958 pp. $86.00 *hc* ISBN 981-02-0975-X.

The Non-Linear Field Theories of Mechanics. Second edition. C. Truesdell, W. Noll. Springer-Verlag, New York, 1993. 591 pp. $89.00 *hc* ISBN 0-387-55098-4.

Partial Differential Equations IV: Microlocal Analysis and Hyperbolic Equations. *Encyclopedia of Mathematical Sciences 33.* Yu. V. Egorov, M. .A. Shubin, eds. Springer-Verlag, New York, 1993. 241 pp. $79.00 *hc* ISBN 0-387-53363-X.

Phantoms and Computational Models in Therapy, Diagnosis and Protection. *ICRU Report 48* International Commission on Radiation Units and Measurements, Bethedsa, MD., 1992. 194 pp. $55.00 *pb* ISBN 0-913394-45-9.

A Primer of Nonlinear Analysis. *Cambridge Studies in Advanced Mathematics 34.* A. Ambrosetti, G. Prodi, Cambridge U. P., New York, 1993. 171 pp. $44.95 *hc* ISBN 0-521-37390-5.

Quantization of Gauge Systems. M. Henneaux, C. Teitelboim. Princeton U.P., New Jersey, 1992. 520 pp. $59.50 *hc* ISBN 0-0691-08775-X.

Quantum Mechanics: Foundations and Applications. *Texts and Monographs in Physics. A. Bohm. Springer-Verlag, New York, 1993. 688 pp. $59.00 hc* ISBN 0-387-97944-1.

Random Media and Boundaries: Unified Theory, Two-Scale Method, and Applications. *Springer Series on Wave Phenomena.* K. Furutsu. Springer-Verlag, New York, 1993. 270 pp. $99.00 *hc* ISBN 0-387-55688-5.

Schrödinger Equations and Diffusion Theory. *Monographs in Mathematics 86.* M. Nagasawa. Birkhäuser, Boston (US dist., Springer-Verlag, New York), 1993. 319 pp. $99.00 *hc* ISBN 0-8176-2875-4.

A Theory of Latticed Plates and Shells. *Series on Advances in Mathematics for Applied Sciences 5.* G. I. Pshenichnov. World Scientific, River Edge, N.J., 1993. 309 pp. $58.00 *hc* ISBN 981-02-1049-3.

Topology of Gauge Fields and Condensed Matter. M. Monastyrsky (Translated from the Russian by O. Efimov). Plenum, New York, 1993. 372 pp. $95.00 *hc* ISBN 0-306-44336-8. ■