advanced material can be found, for example, in a recent review article by William M. Tang in *Nuclear Fusion* (August 1978).

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Ellipsometry and Polarized Light

R. M. A. Azzam, N. M. Bashara
529 pp. North-Holland, New York, 1977. $73.50

"Ellipsometry" is a relatively new word in the vocabulary of physics—it was coined some 30 years ago and has come into common use only rather recently. It refers to the modern technique for measuring the optical constants of materials, surface phenomena such as the formation of oxide films on metal surfaces, and the properties of thin films. Linearly polarized light incident on the surface of interest is usually reflected as elliptically polarized light. Measurements of the azimuth and the ellipticity of the reflected light give the desired information on the surface of the overlaying film.

A considerable literature has accumulated on this measuring technique, and three international conferences have been held. But the book being reviewed is the first comprehensive treatment in English and thus fills an important gap. Comprehensive it is, starting with two chapters describing polarized light in the most modern mathematical terms. These chapters constitute a valuable contribution to the all-too-sparse literature on polarized light.

The third chapter gets down to business in covering the theory and analysis of ellipsometer measurements. The next chapter deals with the reflection and transmission of polarized light by stratified planar surfaces, that is, thin films.

The final two chapters are practical and descriptive in nature, one on instrumentation and one on applications of ellipsometry. An appendix gives a succinct summary of the Jones and Mueller matrices, used in computing the effects of inserting retarders or polarizers into an optical system. The list of 315 selected references will be useful to active workers in this field. The final appendix lists the contents of the *Proceedings* volumes of the three international ellipsometry symposia, held in 1964, 1968 and 1975.

The authors express their hope that the book will be useful to both the newcomer to the field and the specialist. Specialists will in fact find this careful, detailed and authoritative treatment to be most valuable. The beginner, however, may be overwhelmed by the mathematical treatment in the early chapters, and may flounder in trying to perceive the underlying physics. Thus he would be well advised to prepare himself by the careful study of the chapters on polarized light in one of the undergraduate-level optics textbooks.

There is no question as to the professional status and capability of the authors. Rasheed M. A. Azzam and Nicholas M. Bashara are with the Electrical Materials Laboratory, College of Engineering, University of Nebraska, and Azzam also holds an appointment in the College of Medicine of that university. They have both published many research papers in the field; they were active in the international symposia referred to above. They are to be commended on the further, major contribution to polarized light and its applications represented by this excellent book.

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Optics and Lasers: An Engineering Physics Approach

M. Young
207 pp. Springer-Verlag, New York, 1977. DM 52.00

The expansion of optical physics brought about by the laser has also led to a proliferation of texts on optics. *Optics and Lasers* by Matt Young is the newest addition. The book is an outgrowth of Young's teaching at Rensselaer and Waterloo prior to his joining the National Bureau of Standards at Boulder. He has aimed at an updated treatment of optics appropriate to the laser era and aimed particularly at engineering students. Besides treating such standard topics of optics as ray optics and optical instruments, diffraction and interference, and sources and detectors, he has included a 27-page chapter on lasers, an introduction to holography and Fourier optics and a few pages on nonlinear optics. Many topics of classical optics deemed by Young to be of mainly academic or technical interest, such as speed-of-light measurements, rainbow formation and other atmospheric optical effects, and aberration theory, have been omitted.

Young has carefully written the book and has maintained a uniform level of presentation. He includes much up-to-date information useful to a laboratory worker in laser optics and has interspersed an adequate number of problems within the text.

Young states that he has included material from courses that he has taught to both second- and fourth-year students. The question naturally arises as to just what level this book is aimed. In my opinion it is best suited to second-year students, because it is predominantly a qualitative treatment with a minimum use of mathematical analysis. Derivations are seldom longer than a few equations and usually employ only simple algebraic or geometric reasoning. Young's use of elementary calculus is not extensive, and he does not introduce Maxwell's equations and the wave equation. The level of treatment is roughly that of Francis W. Sears's *An Introduction to Optics* (3rd edition, Addison-Wesley, Reading, Mass., 1949), but *Optics and Lasers* is only half as long as that book.

Even though Young has aimed the book at engineering rather than physics students, I am still puzzled by his lack of discussion of the most basic conceptual challenges to the optics student: how both ray optics and wave optics arise from the same phenomenon and how light can act at times like a particle and at times like a wave. The book makes an abrupt change from ray optics to wave optics without any discussion of criteria that would decide which of the techniques is appropriate to a given optical system. The student should not have to glean an understanding of this from scattered hints such as Young includes in his discussion of waveguides.

Incidentally, it is incongruous that "waveguides" should be described under ray optics. In that context and description they should be called "light pipes." Though Young divides detectors into quantum and thermal detectors, he does not introduce the photon concept in relation to the photoelectric effect, let alone elaborate on it. He mentions the photon in passing only in the laser section and there calls it only a "heuristic device." These issues—along with phase velocity vis-à-vis group velocity which is never mentioned—deserve a full, even if only a qualitative, discussion in any optics text.

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new books

Particles, Nuclei and High-Energy Physics

Proceedings of the International Neutrino Conference (Rheinisch-Westfälische Technische Hochschule, Aachen, June 1976). H. Faissner, H. Reithler, P. Zerwas, eds. 748 pp. Vieweg, Braunschweig (US distributor: Heyden, Philadelphia), 1977. $84.00

Solid State Nuclear Track Detectors, Vols. 1 and 2 (Proc. of the 9th Int. Conf., Munich, September–October 1976). F. Granzer, H. Paretzke, E. Schopper, eds. 1350 pp. Pergamon, Elmsford, New York, 1978. $160.00

Many Degrees of Freedom in Field Theory (Proc. of the 8th Int. Summer Institute of

Theoretical Physics, University of Bielefeld, W. Germany, August–September 1976) (NATO Advanced Study Institutes Series, Series B (Physics), Vol. 30). L. Streit, ed. 248 pp. Plenum, New York, 1978. $27.50

Many Degrees of Freedom in Particle Theory (Proc. of the 8th Int. Summer Institute of Theoretical Physics, University of Bielefeld, W. Germany, August–September 1976) (NATO Advanced Study Institutes Series, Series B (Physics), Vol. 31). H. Satz, ed. 566 pp. Plenum, New York, 1978. $45.00

Particles and Fields (Proc. of the Banff Summer Institute, Banff, Canada, August–September 1977). D. H. Boal, A. N. Kamal, eds. 462 pp. Plenum, New York, 1978. $42.50

Advances in Nuclear Physics, Vol. 10. M. Baranger, E. Vogt, eds. 336 pp. Plenum, New York, 1978. $34.50

Topics in Quantum Field Theory and Gauge Theories (Proc. of the 8th Int. Seminar on Theoretical Physics, Salamanca, Spain, June 1977) (Lecture Notes in Physics, Vol. 77). J. A. de Azcárraga, ed. 378 pp. Springer-Verlag, New York, 1978. $14.30

Atomic, Molecular and Chemical Physics

Atomic Energy Levels—The Rare-Earth Elements: The Spectra of Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, and Lutetium (National Bureau of Standards—National Standard Reference Data Series, Vol. 60). W. C. Martin, R. Zalubas, L. Hagan. 411 pp. USGPO, Washington, D. C. 1978. $9.50

Intermolecular Forces. T. Kihara, 182 pp. Wiley, New York, 1978 (Japanese edition, 1976). $23.00

Advances in Chemical Physics, Vol. 37. I. Prigogine, S. A. Rice, eds. 397 pp. Wiley-Interscience, New York, 1978. $32.50

Excited States, Vol. 3. E. C. Lim, ed. 351 pp. Academic, New York, 1977. $32.00

X-Ray Photoelectron Spectroscopy (Benchmark Papers in Physical Chemistry and Chemical Physics, Vol. 2). T. A. Carlson, ed. 341 pp. Dowden, Hutchinson and Ross, Stroudsburg, Pa. (US distributor: Academic, New York), 1978. $31.00

Megawatt Infrared Laser Chemistry. E. Grunwald, D. F. Dever, P. M. Keehn. 107 pp. Wiley-Interscience, New York, 1978. $15.00

Quantum Electronics and Lasers

Computer Modeling of Gas Lasers (Optical Physics and Engineering Series). K. Smith, R. M. Thomson. 416 pp. Plenum, New York, 1978. $42.50

Fluids and Plasmas

Progress in Liquid Physics. C. A. Croxton, ed. 592 pp. Wiley-Interscience, New York, 1978. $63.00

Liquids and their Properties: A Molecular and Macroscopic Treatise with Applications. H. N. V. Temperley, D. H. Trevena. 274 pp. Halsted (Wiley), New York, 1978. $37.50

Turbulence, 2nd edition (Topics in Applied Physics, Vol. 12). P. Bradshaw, ed. 339 pp.

Springer-Verlag, New York, 1978 (first edition, 1976). $19.80

Structure and Mechanisms of Turbulence (Proc. of the Symp. on Turbulence, Technische Universität, Berlin, August 1977) (Lecture Notes in Physics, Vols. 75 and 76). H. Fiedler, ed. 295 and 406 pp. Springer-Verlag, New York, 1978. $13.50 and $16.50

Crystallography, Low-Temperature and Solid-State Physics

Neutron Diffraction (Topics in Current Physics, Vol. 6). H. Dachs, ed. 357 pp. Springer-Verlag, New York, 1978. $32.50

Crystallographic Groups of Four-Dimensional Space. H. Brown, R. Bülow, J. Neubüser, H. Wondratschek, H. Zassenhaus. 443 pp. Wiley-Interscience, New York, 1978. $38.50

Introduction to Superconductivity, 2nd edition (Int. Series in Solid State Physics, Vol. 6). A. C. Rose-Innes, E. H. Rhoderick. 237 pp. Pergamon, Elmsford, N. Y., 1978 (first edition, 1969). $33.00 clothbound, $16.50 paperbound

The Physics of SiO_2 and its Interfaces (Proc. of the Int. Topical Conf., IBM Watson Research Center, Yorktown Heights, N. Y., March 1978). S. T. Pantelides, ed. 488 pp. Pergamon, Elmsford, N. Y. 1978. $35.00

Internal Friction and Ultrasonic Attenuation in Solids (Proc. of the 6th Int. Conf., Tokyo, July 1977). R. R. Hasiguti, N. Mikoshiba, eds. 837 pp. University of Tokyo, Tokyo (US distributor: ISBS, Inc., P.O. Box 555, Forest Grove, Oregon 97116), 1977. $35.00

Astronomy, Cosmology and Space Physics

Galaxies: Structure and Evolution. R. J. Tayler. 203 pp. Wykeham (Taylor and Francis), London (US distributor: Crane, Russak, New York), 1978. £7.70 clothbound, £4.50 paperbound

Asteroids: An Exploration Assessment (Proc. of an Asteroid Workshop, University of Chicago, January 1978) (NASA Conf. Publication 2053). D. Morrison, W. C. Wells, eds. 300 pp. NASA Scientific and Technical Information Office, Washington, D. C., 1978. $11.75 (Available from the National Technical Information Service, Springfield, Va. 22161)

Correction

J. M. Pasachoff and M. L. Kutner's *Teacher's Guide to University Astronomy* (Saunders, Philadelphia, 1978) was erroneously listed in the August 1978 issue (page 61) as costing $4.95. The *Guide* is in fact provided free to instructors using *University Astronomy* as a course textbook.

Geophysics and Planetary Science

A Dictionary of Geography: Definitions and Explanations of Terms Used in Physical Geography, 2nd clothbound edition. W. G. Moore. 260 pp. Barnes and Noble (Harper and Row), New York, 1978 (first paperbound edition, 1949). $16.50

Geomagnetic Diagnosis of the Magnetosphere (Physics and Chemistry in Space, Vol. 9). A. Nishida. 256 pp. Springer-Verlag, New York, 1978. $38.80

Biological and Medical Physics

Horizons in Biochemistry and Biophysics, Vol. 5. E. Quagliariello, F. Palmeri, T. P. Singer, eds. 321 pp. Addison-Wesley, Reading, Mass., 1978. $22.50

Concepts of Radiation Dosimetry. K. R. Kase, W. R. Nelson. 219 pp. Pergamon, Elmsford, N. Y., 1978. $17.50 clothbound, $9.50 paperbound

Instrumentation and Techniques

Future Trends in Superconductive Electronics (Proc. of a conf., Charlottesville, Va., March 1978) (AIP Conf. Proc., No. 44). B. S. Deaver Jr, C. M. Falco, J. H. Harris, S. A. Wolf, eds. 494 pp. American Institute of Physics, New York, 1978. $22.00

Advances in Electronics and Electron Physics, Vol. 45. L. Marton, ed. 389 pp. Academic, New York, 1978. $36.00

Current Interruption in High-Voltage Networks (Proc. of a symp., Brown Boveri Research Center, Baden, Switzerland, September 1977). K. Ragaller, ed. 360 pp. Plenum, New York, 1978. $37.50

History, Philosophy, Society and Government

Why I Left Canada: Reflections on Science and Politics. L. Infeld. 212 pp. McGill–Queen's U. P., Montreal, 1978. $16.95

The Social Production of Scientific Knowledge (Sociology of the Sciences–A Yearbook, Vol. 1). E. Mendelsohn, P. Weingart, R. Whitley, eds. 294 pp. Reidel, Boston, 1977. $26.00

The Dynamics of Science and Technology (Sociology of the Sciences—A Yearbook, Vol. 2). W. Krohn, E. J. Layton Jr, P. Weingart, eds. 293 pp. Reidel, Boston, 1978. $29.50

Patterns for Progress from the Sciences to Medicine (Proc. of a symp., Upjohn Research and Development Center, Kalamazoo, Mich., October 1976). J. A. Hogg, J. C. Stucki, eds. Symposia Specialists, Miami, Fla. 33161, 1977. (Price not stated)

Environmental Psychology. P. A. Bell, J. D. Fisher, R. J. Loomis. 457 pp. Saunders, Philadelphia, 1978. $15.95 in US, $18.35 in Canada

Time as Conflict: A Scientific and Humanistic Study. J. T. Fraser. 356 pp. Birkhäuser Verlag, Basel (US distributor: Renouf, Brookfield, Vt.), 1978. $29.50

How We Know: An Exploration of the Scientific Process. M. Goldstein, I. F. Goldstein. 357 pp. Plenum, New York, 1978. $14.95

Miscellany

German–English Science Dictionary, 4th edition. L. DeVries, L. Jacolev. 628 pp. McGraw-Hill, New York, 1978 (first edition, 1939). $14.50

Farewell to Darwin: The Unified Field Theory of Physics, the Genetic Process, and Psychology. G. M. Hall. 498 pp. Warren H. Green, St. Louis, 1977. (Price not stated)

The Tokyo Puzzles. K. Fujimura. 184 pp. Scribner's, New York, 1978. $8.95 □