

Low Cost Sputtering

**Randex 3140-6J
with ½kW power supply
now only \$6,450***



- Complete 6" cathode sputtering unit interfaces with any vacuum station 14" or larger.
- Most versatile system available—performs RF sputter deposition, bias sputter and sputter etch. (DC sputter/etch is optional).
- $\pm 5\%$ deposition uniformity guaranteed.
- Highly efficient matching network combined with ½kW RF power supply does as much useful work as many 1kW and 2kW supplies.
- Also available with an 8-inch cathode.

The Randex 3140-6J is the ideal choice for the research lab with a modest budget. For more details and our new sputtering catalog, contact us at Perkin-Elmer Ultek, Inc., P.O. Box 10920, Palo Alto, CA 94303. (415) 967-2100.

*U.S. List Price

RANDEX®
sputtering systems from
PERKIN-ELMER

reasonable amount of exactness (both theoretical and experimental) and that, of all simple materials in the world, water in all its forms is undoubtedly the one with the greatest significance for biological and geophysical processes.

Peter Hobbs, a product of John Mason's cloud-physics group in Imperial College London, is Professor of Atmospheric Sciences at the University of Washington and has contributed largely to the physics of ice in this context. His book reflects this interest by devoting 90 pages to ice in clouds compared with only 20 pages for all other applications, but basically it is an exposition of the pure physics of ice, directed at graduates in physics or chemistry working in neighboring fields. One might dispute the publishers' claim that it is the "first comprehensive account," since its subject matter is nearly identical with its smaller Cambridge counterpart, but comprehensive it certainly is. Crystallography, electrical, optical, mechanical and thermal properties, nucleation and crystal growth are all thoroughly covered, but no attention is given to liquid-water structure.

The discussion throughout is clear, accurate and logically presented with detailed experimental results and derivation of important theoretical treatments given in full. The bibliography of over 1200 items covers all important work up to 1973, and there is a useful index of experimental data. The design and production maintain the usual high standards of the Clarendon Press.

Certainly this will remain the standard reference work on ice physics for many years to come and should be in every library with even peripheral interest in the subject. Its size and cost will probably deter both the casual reader and private purchaser.

NEVILLE H. FLETCHER
*University of New England,
Armidale, Australia*

Hydrogen Bonding

M. D. Joesten, L. J. Schaad
622 pp. Marcel Dekker, New York, 1974.
\$45.00

Studies on hydrogen bonding have grown extensively since the mid-1930's. The first attempt to cover this subject comprehensively was the 1960 book *The Hydrogen Bond* by George C. Pimentel and Aubrey L. McClellan. It is pointed out by these authors, and rightly so, that the hydrogen bond is as important to living things as the carbon-carbon bond.

The current book by Melvin D. Joesten and L. J. Schaad essentially updates the prior work of Pimentel and McClellan to early 1974. There is a similarity

in the type and scope of coverage, in the arrangement of the bibliography, and in the extensive tabulation of data. There is a dichotomy in style that reflects the contribution and interest of each author. The chapter on the theory of the hydrogen bond, written by Schaad, is divided into two parts. The first is simply a general background to quantum theory, which can be skipped by those acquainted with the field but which should be quite helpful to beginners. The remaining four chapters, written by Joesten, cover such topics as experimental methods (mostly spectroscopic), thermodynamic and kinetic aspects, and correlations among the thermodynamic and spectroscopic data. These are areas in which Joesten has done research.

The authors are to be commended for organizing and arranging in a single work the data of several thousand publications scattered among many journals. But vast as it may seem, it should be noted that hydrogen bonding is just one aspect of the general field of electron donor-acceptor interactions. As such, the book should be of interest to a large segment of scientists ranging from biochemists to molecular physicists, with the largest audience being chemists.

MILTON TAMRES
*University of Michigan
Ann Arbor*

The World of Measurements

H. A. Klein
735 pp. Simon and Schuster, New York,
1974. \$14.95

It pains me to write this kind of review, but this is not a very good book. The author, H. Arthur Klein, has gone to enormous trouble to deal with measurement systems in all of the various fields of physics, but his presentation reveals all too frequently that he does not understand what he is writing about.

His purpose of expounding and advocating the International System of Units (SI) is something to which I am most sympathetic. However, he has gone to great lengths to seek out all the units that have ever been used, some of which I have never encountered before in fifty years as a physicist, and I feel that this detracts a good deal from the usefulness of his presentation.

He confuses the weight-mass problem by suggesting that, using SI units, a housewife would buy food by the newton (the SI unit of force) whereas she would certainly buy it by the kilogram, since it is the mass of food she is interested in, even though the weighing process utilizes the gravitational force on

MATERIALS RESEARCH CENTER REPORTS...

On Low Density Metallic Glasses.

that mass. The term "weight," as commonly used in this context, is a synonym for mass and does not mean "force." The gravitational force on a given mass, for which the term "weight" is also used in a different context, varies over the surface of the Earth by as much as 0.5% due to variations in the local value of "g," the "acceleration of gravity," but not by 1 to 2% as the author says. And the author's decimal points were flying high when he said that g will drop by 1.5%, due to the inverse square law of gravitational attraction, when you go up 500 meters. The decrease he gives is 100 times too big—one would have to go about 5.5 times as high as the top of Mount Everest to find a 1.5% decrease in g .

His treatment of entropy, about which he is terribly confused, conveys the false impression that the scientists who deal with it are equally confused. He is impressed by the fact that entropy is not the same thing as heat capacity, although the units for both are the same. He just never gives the simple relationship

$$\Delta S_P = \frac{C_P \Delta T}{T}$$

which would have taken all the mystery out of that fact.

When he discusses electric charge density, which is a meaningful concept only when charge is distributed throughout a volume, he calculates the charge density for the case of a point charge at the center of a sphere of radius 1 meter. He says that the electric displacement, D , is the surface density of charge, not understanding that D is a field quantity whose units are the same as those of surface density of charge.

There are 32 pages purporting to deal with density but actually dealing only with the taxation of alcoholic beverages and the use of density measurements as the basis for taxation. In Britain the taxation of beer is based not on the end product but on the density of the "wort," that is, the infusion of sugars in water from which the brew is produced by fermentation. It is an amusing account but, here again, the author eventually shows that he does not understand. He says that the tax was at one time 75 pence per barrel for wort of a "normal" relative density of 1.057 and was adjusted to correspond to deviations from this norm. As an example, he calculates that a relative density of 1.035 is about 98% of the norm and that the tax would be 98% of 75 pence. If we carry this reasoning a step further we can calculate that pure water has a relative density of 1 or 94.6% of the norm and would be taxed about 71 pence!

The subject of "proof spirit" for whiskey is complicated and it is not surprising that he gets that wrong, too. He does, however, provide the inter-



A series of titanium-beryllium metallic glasses has been discovered by Lee Tanner and Ranjan Ray of Allied Chemical's Materials Research Center. These new Be-Ti-Zr alloys are the first nonferrous metallic glasses having low densities; wide potential utility is based on this and other properties.

Ternary Metglas® materials covering the composition range bounded approximately by the binary eutectic compositions $\text{Be}_{37}\text{Ti}_{63}$ and $\text{Be}_{35}\text{Zr}_{65}$ have been produced in the form of continuous ribbons.

In these materials, beryllium which has the highest intrinsic specific strength of any metal has been combined with corrosion resistant titanium to yield low-density glasses with novel properties. Small amounts of zirconium have been added to increase thermal stability. The resulting glasses have a remarkable combination of light weight, high strength, elastic stiffness, and electrical resistivity.

Those interested in additional information and/or samples of Metglas 0422, a representative composition, are invited to write: Allied Chemical Corporation/Materials Research Center, P.O. Box 1021R, Morristown, N.J. 07960.

® Registered trademark of Allied Chemical Corporation



Why Horse Around With a Loser?



Switch to a Winner with Pulsar!

If reliable high voltage switching has become a "nagging" problem, we'd like to help. Pulsar Associates' new SW-40K Packaged High Voltage Switch now offers trouble-free service up to 40kV.

The SW-40K is a high voltage [40kV, 40kA] pressurized spark gap which combines precision switching [± 1 nS jitter] with the convenience of a packaged format. Fully self-contained, only synthetic air and an appropriate trigger are required for operation. The SW-40K is ideally suited to applications such as flash-lamp driving, laser pumping and precise triggering of multiple switch arrays.

We think you'll agree, in performance and convenience, the SW-40K represents a substantial improvement over the spark plug generation of high voltage switching.

Don't horse around: "switch" to a winner—switch to Pulsar!



7911 Herschel Avenue, Suite 400,
La Jolla, CA 92037 (714) 459-3426

Circle No. 42 on Reader Service Card

esting historical note that the term "proof" is derived from an early British test or proof in which whiskey and gun powder are mixed and then ignited. If it burned well, it was "above proof" and had a higher tax than if it was "below proof" and would not burn.

In the section dealing with radiation doses, much of the material is well presented. Since room-temperature kinetic energies are of the order of 0.04 eV, it was a shock to find that this order of kinetic energy for neutrons is described simply as "below 1 MeV." The presentation of the hazards to health from nuclear radiations seems designed to discourage the further development of nuclear power. A more balanced discussion would consider the corresponding health hazards from developing the same amount of power from other sources. While I agree that we should set high standards for protection against additional radiation damage to people, over the natural "background radiation" effects, I believe that we have to balance benefits against risks that are kept minimal.

Klein has written interestingly about time and its measurement with atomic clocks, and the book is laced with anecdotes about the lives and scientific work of the many scientists after whom units have been named. I was interested to learn that the temperature scale adopted by Celsius had the ice point at 100° and the boiling point of water at 0°, but we have honored him by giving the name "Celsius" to the temperature scale in which the icepoint is 0° and the boiling point of water is 100°. The account of how Pascal got his brother-in-law to climb the Puy du Dome with a mercury barometer in 1648, demonstrating that the weight of air is responsible for atmospheric pressure, is well done.

While the book is interesting in some parts, the errors, of which I have cited only a fraction, so detract from its overall quality that I cannot recommend it.

HUGH C. WOLFE

American Institute of Physics
New York, New York

new books

Elementary Particles and Fields

Introduction to Axiomatic Quantum Field Theory. N. N. Bogolubov, A. A. Logunov, I. T. Todorov. 707 pp. W. A. Benjamin, Reading, Mass., 1975. \$32.50

Theories and Experiments in High-Energy Physics (Conf. Proc. of the 2nd Orbis Scientiae, Univ. of Miami, 1975). A. Perlmutter, S. M. Widmayer, eds. 486 pp. Ple-

Rapid publication of research in physics

A new physics letters journal

COMMUNICATIONS ON PHYSICS is a new international physics letters journal commencing publication in January 1976. It will provide rapid publication of important new work in all areas of pure physics apart from nuclear and high energy physics.

Established readership

The journal will be sent free of charge during the whole of 1976 to individual and library subscribers to *Philosophical Magazine*, *Advances in Physics* and *Molecular Physics* and to any library that requests it. An immediate circulation to the physics community throughout the world is thereby assured.

Acceptance for publication

Papers may be in English, French or German and should reach the Editors from 1st October 1975. Maximum length is 2500 words. Copies of Instructions to Authors may be obtained from the Editors or from the publishers.

Editors and Editorial Board

David Caplin and David Sherrington
Department of Physics,
Blackett Laboratory, Imperial College,
London SW7 2BZ.

The Editorial Advisory Board is composed of distinguished physicists from all parts of Europe.

Free subscription for 1976

Librarians and others who wish to receive *Communications on Physics* from the first issue should write to Miss Ann Donovan, Taylor & Francis Ltd, 10-14 Macklin Street, London WC2B 5NF.

Communications on Physics

the NEW physics letters journal from
TAYLOR & FRANCIS



10-14 Macklin Street
London WC2B 5NF

Circle No. 43 on Reader Service Card