

states that all except a small number of observations come from the assumed data-generating model with given mean and variance. The aberrant observations arise independently from a modification of the initial distribution where either the mean or variance is shifted in value. However, the discussions are neither easy to follow nor do they provide much guidance in choosing the best technique for a particular situation. This is not exclusively the problem of Barnett and Lewis. It is, unfortunately, the state of current knowledge of outlier theory. For example, what constitutes a suitable perfor-

mance criterion for a test of discordancy is an open issue.

The organization of the book into a "tests of discordancy-accommodation" dichotomy inevitably leads to some redundancy. But this is not serious. Nor are the several typographical mistakes, for example, on page 49 where a section has been omitted; on page 76 (a spelling error) and the garbled phrasing on page 90. Perhaps the weakest section is the chapter on multivariate data. For completeness the authors have included this material. But again the problem is that so little is known! If my attitude toward the book

is somewhat ambivalent, it should not mask the fact that Barnett and Lewis have made a significant contribution. One hopes that the book will be useful to the data analyst/statistician in furthering the development of outlier methodology.

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Polymer Surfaces

D. T. Clark, W. J. Feast
441 pp. Wiley, New York, 1978. \$49.50

Polymer surface behavior has recently been achieving recognition as a field that is both scientifically and technologically important. Direct or nearly direct physical methods of studying polymer surfaces have been attracting considerable attention. A symposium was held in England recently at the University of Durham on this subject, and this volume is the outcome of that meeting. Clark and his co-workers have an active research program at Durham, and they have put together an excellent volume of papers from the Durham symposium.

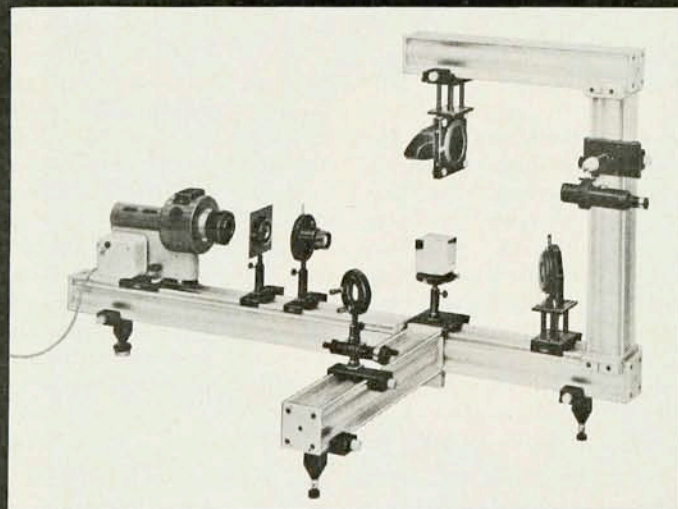
Physical measurements for surface characterization are covered, such as the important ESCA technique (by Clark) and infrared spectroscopy (by H. A. Willis and V. J. I. Zichy). J. D. Hoffman and G. T. Davis have attempted to resolve the problem of "regular folds" versus an "amorphous layer" for the surface of polymer single crystals. Their solution is to hypothesize a layer of "polymer molecules that are physically adsorbed on a fairly regular folded surface . . . with loops or traverses between points of attachment . . . [which] may be detachable under appropriate circumstances." Their argument is worth examination.

There are five chapters on friction, adhesion and wear of polymers, and four on electric charge effects. The balance of the book (there are 19 chapters) includes a number of chemical and applied topics, such as photopolymerization, the use of plasmas in surface modification, photo-oxidation, and other modes of surface deterioration.

The editors have not restricted themselves to the narrowest definition of polymer surfaces, and they concede that the depths involved (1 micron or more) will not be uniformly approved. But in fact, the sub-surface region of a polymer does deviate from that of the bulk in ways that very strongly influence behavior in adhesion as well as other phenomena. To exclude this sub-surface region from consideration would be to leave that region, as it were, a never-never land, inaccessible to investigation. And it would greatly diminish the value of work with

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regard to the last one or two layers of atoms. Polymers differ from low-molecular-weight materials in this relatively deep sub-surface involvement in surface behavior.

I note very few topics that are particularly slighted. One, however, is the wetting of polymer surfaces by liquids. The topic of contact angles is mentioned only in passing, in the chapters by B. J. Briscoe and by H. Schonhorn. Both of these authors are concerned primarily with practical adhesion and friction, and so do not treat contact angles *per se*.

I feel that an interesting and valuable discussion could have been given by somebody on the topography of polymer surfaces as revealed by scarring electron microscopy. (A few SEM photographs are included in the last two chapters, on photodegradation and tribology.) Also, the porosity of polymers is a topic where modern physical methods prove useful. The interior surface of a pore, after all, is continuous with the external surface of the polymer.

Most of the material in this book is of the nature of review. The Hoffman and Davis paper provides a novel synthesis of the papers that are reviewed. A short paper by G. A. Gamlen, on "epitropic fibres," that is, fibres whose surface is chemically modified to a depth of 0.5 to 2 microns by a particle-imbedding process recently developed at ICI, presents the outcome of some recent research and developmental work there.

There is no comparable book available in the field, and this volume should be widely useful to polymer physicists, physical chemists, surface chemists and experimentalists in general.

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new books

Particles, Nuclei and High-Energy Physics

Advances in Nuclear Physics, Vol. II. J. W. Negele, E. Vogt, ed. 420 pp. Plenum, New York, 1979. \$37.50

Pion-Electroproduction: Electroproduction at Low Energy and Hadron Form Factors. E. Amaldi, S. Fubini, G. Furlan. 170 pp. Springer-Verlag, New York, 1979. \$29.80

An Introduction to Quarks and Partons. F. E. Close. 490 pp. Academic, New York, 1979. \$54.50

Quantum Mechanics. A. Böhm. 530 pp. Springer-Verlag, New York, 1979. \$28.80

Atomic, Molecular and Chemical Physics

Notes from the Nordic Spring Symposium on Atomic Inner Shell Phenomena Vols. 1

and 2 (Proc. of a symp., Geilo, Norway, April 1978). J. M. Hansteen, R. Gundersen, eds. 155 and 221 pp. U. Bergen, Bergen, Norway, 1979 (price not stated)

X-Ray Spectroscopy: An Introduction. B. K. Agarwal. 425 pp. Springer-Verlag, New York, 1979. \$40.70

Physical Chemistry of Filled Polymers. Y. S. Lipatov. 230 pp. Rubber and Plastics Research Association, Shrewsbury, U.K., 1979 (Russian ed., Khimiya, Moscow, USSR, 1977). \$62.50

Topics in Carbon-13 NMR Spectroscopy, Vol. 3. G. C. Levy, ed. 406 pp. Wiley-Interscience, New York, 1979. \$35.00

Introduction to Magnetic Resonance with Applications to Chemistry and Chemical Physics. A. Carrington, A. D. McLachlan. 281 pp. Chapman and Hall (Wiley), New York, 1979 (first published, Harper & Row, 1967). \$16.95

Chemistry of the Metal-Gas Interface. M. W. Roberts, C. S. McKee. 605 pp. Oxford U., New York, 1979. \$65.00

Tungsten: Sources, Metallurgy, Properties, and Applications. S. W. H. Yih, C. T. Wang. 516 pp. Plenum, New York, 1979. \$47.50

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