one on the interantipodeal tunnel, and one about the Eiffel Tower. It also covers the classical physics of the microscopic world—free electrons, α-particles, protons and electrons in atoms. The correspondence principle, the Schrödinger equation, and Planck's constant appear; these are properly classical too. (There ought to be alternative answers to the problem about engraving the Lord's Prayer on a pin-head, since it comes in two lengths, differing by about 8 per cent.)

Many of the problems originated as questions in Part 1 of the Natural Sciences Tripos. Behind them lies an inventive genius that can design examples to exercise specific techniques, and build in both standard difficulties and unusual subtleties; with an occasional sparkle of wit. I have not sampled all the problems myself; but I am sure that they will develop the competence of students at this level, while maintaining their interest and enthusiasm.

G. R. Noakes

TECHNOLOGY AND SCIENCE OF CERAMICS

Progress in Ceramic Science

Vol. 2. By Dr. J. E. Burke. Pp. vii + 245. (London and New York: Pergamon Press, 1962.) 80*s*. net.

Science of Ceramics

Vol. 1: Proceedings of a Conference held at Oxford, 26–30 June 1961, under the auspices of the British Ceramic Society and the Nederlandse Keramische Vereniging. Edited by G. H. Steward. Pp. 334. (New York and London: Academic Press for the British Ceramic Society, 1962.) 65*s*.

TEN years ago anyone wanting a book on either the technology or science of ceramics would have had a rather limited field from which to choose, but so rapid has been the development of interest in non-metallic inorganic materials in the past few years that the supply of substantial literature can barely meet the demand. Technological pressure in the field of materials research has opened up new horizons both for the applied scientist and for the fundamentalist in solid state physics, and the two books reviewed here illustrate both aspects of this.

The book *Progress in Ceramic Science* is the second of a series put out by the publishers to provide a continuing review under the general editorship of Dr. J. E. Burke of the General Electric Co. Research Laboratory, Schenectady, and contains just four major contributions from American authors. The first, on dislocation etch-pits in non-metallic crystals, provides a useful survey of theory and techniques which should offer some encouragement to workers who are apt to complain that their materials are so full of holes anyway that crystal defects can scarcely matter! The second article deals with the catalysed crystallization of glass, and comes from the laboratory (Corning) in which the 200-year-old observation of Réaumur has been turned into a brilliant practical reality. The theory of crystallization in glasses is outlined, and nucleation by the use of oxide and metal catalysts and by the action of ultra-violet light or X-rays on photosensitive glasses is discussed. Next comes a chapter on radiation damage, an important question in view of the increasing interest in the use of oxides and carbides, rather than elemental metals, in nuclear engineering. The last chapter is an examination of the problem of thermal conductivity in ceramic dielectrics and provides a wealth of new experimental information on a wide range of oxide materials and glasses.

The book *Science of Ceramics* is quite different in character and is in effect a supplementary volume to the *Transactions of the British Ceramic Society*. It is the outcome of a joint effort between the British and Netherlands Ceramic Societies to co-operate in providing a European forum for the exchange of papers on the 'basic' science of ceramics, and it is a record of the proceedings of a conference held in Oxford in the summer of 1961—the first, one understands, of a series of such conferences. Apart from the very useful and authoritative review of sintering by Prof. J. White with which the book opens, the other twenty-two papers are accounts of various researches in progress, ranging from studies on clays themselves to the properties and performance of end-products as diverse as building ceramics, high-permittivity dielectrics and fluoride-based ceramics.

Both books are very well produced and contain some fascinating optical and electron micrographs. With such a rapidly expanding subject, it would be pointless to comment on the probable permanent value of either volume, but there is no doubt of their timeliness and immediate value.

N. F. Astbury

ORGANIC SEMICONDUCTORS

Organic Semiconductors

Proceedings of an Inter-Industry Conference. Editors: James J. Brophy and John W. Buttrey. Pp. xi + 243. (New York and London: The Macmillan Company, a Division of the Crowell-Collier Publishing Company, 1962.) 68*s*., 9.00 dollars.

THE recognition that conjugated organic substances can behave as intrinsic semiconductors by virtue of thermally excited π-electrons only dates from 1948. Over the ensuing years a few papers appeared every year, until around 1958 contributions started to appear in various scattered conferences. By this time the main types of compound, phthalocyanines, polyaromatics, charge-transfer complexes, etc., had been recognized, and in 1959 there appeared reports of semiconductivity in polyacrylonitrile. This activity had developed in such widely scattered countries as England, the U.S.S.R. and Japan, and around 1959 several large American industrial firms decided to proceed on from literature surveys to active experimental work. The result has been an ever-increasing volume of papers which have given considerable stimulus to the subject. The present volume is entirely concerned with these American contributions. The first three papers, by R. G. Kepler, O. H. LeBlanc, jun., and M. Silver, are concerned with the experimental and theoretical aspects of determination of charge carrier mobility in highly purified single crystals of anthracene. The pulse techniques advocated by these authors may be expected to be widely adopted by workers in the field and form a contribution of great importance.

Further papers deal with charge-transfer complexes in single crystal form, and there are a variety of papers dealing with d.c. measurements on compressed powders, of which the two papers by H. A. Pohl on semiconduction in polymers are worth special mention. There is a very substantial contribution by C. A. Klein on the electrical properties of pyrolytic graphites, and the volume concludes with a not too illuminating "management appraisal". Those academic scientists interested in the purely scientific aspects of organic semiconductors will be able to find a good deal of the present work available in fairly accessible journals. But industrial scientists requiring a fairly up-to-date collection of papers prepared with industrial research in mind will find this volume very useful. I myself have long held the opinion that industrial developments in this field have been held up by the need to secure collaboration between electrical and chemical industries. Conferences such as the present one should help to break down the dividing barriers, and deserve every encouragement.

D. D. Eley