ear integral equations are elegantly summarized and abstracted in the theory of the eigenvalue spectrum of positive definite operators. The core of the book presents a remarkably thorough treatment of the classical theory of linear elliptic equations, and some classical potential theory. However, equations with variable coefficients and non self-adjoint equations are hastily sketched. There follows a shorter investigation of parabolic (heat-conduction) and hyperbolic (wave) equations, with emphasis on Fourier methods. An unusual feature is a chapter on properly and improperly composed problems in the field.

Surprisingly, a good knowledge of classical functional analysis is assumed from the reader. Because of this, one can only recommend the book to the most advanced physics graduate students. However, it does not deserve its title of "an advanced course" either. The applied mathematician will find that most contemporary ideas and results in partial differential equations are missing. Such important tools as generalized solutions and Sobolev spaces are barely sketched. Nonlinear problems (including the study of shocks) which are so prominent in today's applied mathematics, are ignored for all practical purposes.

To conclude, graduate students—and perhaps researchers in applied mathematics—will find it to be a handsome treatment of and reference for methods of classical partial differential equations.

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Techniques of Chemistry, Vol. III: Photochromism

G. H. Brown ed.
853 pp. Interscience, New York, 1971. $47.50

After a short historical survey and outline of fundamental aspects of photochromism (the reversible process in which a solid changes color on exposure to light and thermal reverts to the original in the dark), the major portion of this thick, densely packed book deals with organic molecular photochromic transformations, their kinetics and spectral characteristics. Shorter chapters on inorganic solid-state photochromism, photochromic glasses and photochromism in living systems lead to the concluding chapter on applications.

After a decade of intense study spurred by support from both government and industrial sources, photochromics failed to achieve the broad utility initially envisioned. As stated in the last chapter describing chemical switches for computers, "The materials that showed a large spectral change in microseconds (the organic dyes in solution) generally exhibited pronounced fatigue. Those that showed negligible fatigue (solid inorganics and glasses) generally exhibited small, slow spectral changes." These limitations also retarded commercial utilization in other applications. With the present hiatus in activity, it is appropriate to take stock.

This book is a nearly perfect definitive record of photochromic accomplishments to date. The unevenness inevitable in a multi-authored text has been minimized by the care given to organization by the editor, Glenn H. Brown. The text is up-to-date with many references published in 1970. It contains detailed information in extensive tables of photochromic materials compiled from journal publications, patents and government and company reports. As a relatively small portion of the data has appeared in the journals, the book should be welcomed by

those investigators who, for lack of availability, do not usually utilize the nonjournal primary sources. It describes, in detail, experimental conditions used in photochromic studies and the mathematical treatments that have been developed. Several chapters critically describe mechanistic models that have been proposed and suggest areas for further research.

The study of photochromism is an interdisciplinary affair. The basic investigations have been reported by physicists, chemists and biologists. Those interested in molecular organic photochemistry will find the text of particular interest. The last chapter, by Robert C. Bertelson of the National Cash Register Company, is an unusually thorough and frank summary of the applications to which photochromics have been put, the design of instruments, and the performance characteristics of photochromic materials.

The text should be a first choice for a newcomer to the field and a welcomed reference source to those who are continuing research in photochromism.

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Point Defects and Diffusion

C. P. Flynn
826 pp. Oxford University Press London, 1972. $51.00 (£15.00 in U.K.)

There is a clear need for a really good new book on point defects and diffusion. The fields are of importance in problems ranging from nuclear reactors, to semiconductor devices, to alloy design, as well as being of intrinsic scientific interest. Yet the only such books available, *Diffusion in Solids* by Paul Shewmon (McGraw-Hill, 1963) and *Point Defects in Metals* by A. C. Damask and G. J. Dienes (Gordon and Breach, 1963) are seriously out of date and fail to cover many topics of current interest. Pete Flynn, in a mammoth book, has set himself the task of covering "the vigorous, sprawling, literature concerning impurities, thermally activated defects, and atomic mixing processes in crystals." Flynn is a professor of physics at the University of Illinois, a most important center of research in this field for many years, and is very well qualified for this job. He has made contributions in both diffusion and point defects and has a tremendously broad knowledge of these active fields.

Flynn discusses basic principles in a number of areas and illustrates these with experimental data as appropriate. Major portions of the book are devoted to general aspects of point defects including thermodynamics, lattice vibrations, and electronic properties, and to the fundamental principles of diffusion, including stress effects and precipitation. Finally the concepts developed in the book are applied to experimental results on various types of materials. Throughout, Flynn demonstrates prodigious knowledge and great physical insight. The mathematical treatments are a delight to the experienced researcher and can give him new views of familiar subjects. For instance, in his presentation of diffusion, Fick's Laws, which are essentially macroscopic or continuum in their approach, are derived in the most general way possible. Subsequently, diffusion is considered in terms of the plane-wave eigenvectors of the defect jump matrix and then are examined as a random walk of a defect. These various approaches give similar results, but the different formulations are most useful and appropriate for different problems. This is seen subsequently in elegant treatments of the Kirkendall effect, thermomigration, internal friction and precipitation kinetics.

Flynn's book is difficult to read.