

Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (J. H. Robertson, School of Chemistry, University of Leeds, Leeds LS2 9JT, England). As far as practicable books will be reviewed in a country different from that of publication.

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Advances in liquid crystals, Vol. 4. Edited by G. H. BROWN. Pp. xiv + 210. London: Academic Press, 1980. Price £15.80, US \$28.00.

Since the issue of the first volume of this series in 1975, the study of liquid-crystal characteristics and structures has been carried on at a more and more important pace.

This volume is divided into four chapters. The first one is very important and contains many details (75 pp.) of flow phenomena. It gives scientists particularly interested in this field of modern physics a complete review of the studies carried out on the subject (288 references, mostly relating to studies carried out in the last ten years). The author, F. M. Leslie, a mathematician, considers the unique vector field continuum theory, due to himself and J. L. Ericksen, which allows the study of flow phenomena in liquid crystals. A few notions about other theories are given, in particular those of Sero & Bulygin and Lee & Eringen. The problems of viscometry and propagation of perturbations (periodic waves and front waves) are dealt with on the basis of these theories. Some other topics are reviewed such as thermally induced movements or the effects of variable magnetic fields. Some theoretical predictions are compared with experimental results.

The second chapter studies the effect of high pressures on liquid crystals. S. Chandrasekhar & R. Shashidhar describe different equipment and techniques of experimental effects of pressure on mesophase transitions (optical transmission, DTA, NMR, volumetric method). Clapeyron's law $dP/dT = \Delta H/T\Delta V$ is analysed for two compounds, PAA and PAB. A very marked odd/even effect is shown (in five homologous series) regarding the nematic-isotropic transition. Varied aspects of mesomorphism induced by pressure are described: appearance of mesophases for non-mesogenic terms in a mesogenic series; change of a monotropic mesomorphism into an enantiotropic mesomorphism; disappearance of a mesophase under pressure action. A few other aspects are approached, such as the order parameter study and the pressure effect on the cholesteric pitch. A great number of diagrams illustrate this chapter, completed by 98 references.

In the third chapter E. T. Samulsky & D. B. Du Pré deal with polymeric liquid crystals. By considering macromolecular and supramacromolecular structures, these authors show how polymers can produce liquid-crystal-type ordering. Onsager's and Flory's theories are explained concisely. The thermotropic and lyotropic phases of many compounds such as polyesters and polyethers (Th), polyamides, polypeptides and nucleic acids are studied in detail (66 references).

The last chapter, due to R. Schaetzing & J. D. Litster, deals with light scattering by liquid crystals. Light scattering as an experimental tool to investigate the properties of condensed matter has undergone a renaissance since the invention of the laser. The authors recall some important

notions relating to universally accepted methods such as Rayleigh and Brillouin diffusion. The isotropic phase is studied first; the transition between an ordered and an isotropic liquid phase of a liquid crystal is characterized by the presence of short-range order in the isotropic phase. Then the diffusion linked to the different nematic thermotropic phases and their transitions is analysed. This chapter continually draws a parallel between diffusion theories and experimental results through various bibliographical references (178).

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Chemical physics of solids and their surfaces, Vol. 8. Senior reporters M. W. ROBERTS and J. M. THOMAS. Pp. x + 250. London: The Royal Society of Chemistry, 1980. Price £48.00, US \$130.00.

This volume of the *Specialist Periodical Reports* reviews, in the first four chapters, surface effects and surface characterization methods in theory and by numerous examples. The following two chapters are focused on planar defects in non-stoichiometric inorganic crystals and the final contribution deals with organic solid-state chemistry.

The present state of the subject of *The adsorption and absorption of hydrogen by metals* for platinum, palladium, rare-earth and titanium intermetallic alloys is reviewed in the first chapter by R. Burch. Attention is drawn to the nature of absorbed hydrogen, adsorption/absorption transitions, mechanisms of adsorption, and structural modifications in alloys. This part ends with the existing theoretical models of the binding of adsorbed and absorbed hydrogen.

The second article, by J. P. Jones, describes *Some developments in field emission techniques and their application to surface studies*. A brief summary of the practical and theoretical operating principles of field electron and probe hole microscopy is followed by a description of their application to work function measurements, adsorption studies, etc. The section on field emission spectroscopy describes the principles and some experimental aspects. The application to the study of clean metal surfaces and adsorption effects shows its contribution to recent progress in the understanding of the electronic properties of surfaces.

In pursuit of surface topography, by C. S. McKee, discusses the wide range of analysis techniques to pursue the structural aspects of the surface. Theories and mechanisms of electron, photon, neutron, ion, atom and molecule probing are presented and numerous examples emphasize the