

Preface

For the first time in this series we have considered physisorption, one of the pillars of contemporary surface chemistry. Landman and Kleiman have adopted a detailed microscopic approach covering both theoretical and experimental aspects of physisorption and drawing widely from diverse areas of science to provide a thorough analysis of the current state of knowledge. An interesting contrast is evident in the articles of Knor on the one hand and Lloyd, Quinn, and Richardson on the other. Knor has chosen to consider in an essentially phenomenological fashion the interplay between theory and experiment with relation to the surface chemistry of metals. He poses problems for the theoretician and asks questions of the experimentalist. Lloyd, Quinn, and Richardson consider the particular advantage of one recent experimental development, namely angle-resolved ultraviolet photoelectron spectroscopy, in relation to theoretical aspects of metal surfaces *per se* and also adsorption on these surfaces. The general area of photoemission from metal surfaces has been considered in previous volumes (Roberts, Brundle, Spicer *et al.*, Mason *et al.*) but this is the first time we have discussed in detail the advantages that accrue from angular studies. A new departure in this volume is a review of the application of conversion electron Mössbauer spectroscopy to surface studies, by Tricker, who describes the experimental approach, discusses various aspects of the sensitivity of the technique, and outlines some successful applications.

Tanner's contribution also represents a new departure for this series. His succinct account, illustrated with examples from disparate fields, of how crystal perfection may be assessed by *X*-ray topographic methods is particularly timely, since it is very likely that considerable reliance will in future be placed on non-destructive topographic methods with the continued advances in *X*-ray optics and with the increasing availability of synchrotron radiation. The comprehensive chapter by Corish, Jacobs, and Radhakrishna returns to the topic of point defects in ionic crystals which was the subject of a major review (by Corish and Jacobs) in Volume 2. Ionic solids continue to elicit the interest of a wide spectrum of researchers, from the computational physicists on the one hand to those engaged in technological developments associated with fuel cells, solar energy converters, electrocatalysts, and the like on the other. It is appropriate, therefore, that as well as dealing with intrinsic and impurity (ionic and molecular) defect parameters in ionic crystals, fast ion conduction is also discussed.

The two remaining chapters differ markedly from one another. Sherwood's summarizing contribution focuses attention upon highly plastic molecular crystals where interesting advances have been made, many by Sherwood himself, in the past three years. In this context the dislocation is of paramount importance. In the final chapter Hutchison, Jefferson, and Thomas survey the current scene in the solid-state structural chemistry of a range of minerals. Enormous progress, chiefly through the agency of high-resolution microscopes (the principles of which were reviewed by Anderson and Tilley in Volume 3), has been made in this area within the past few years. In this particular context, the importance and ubiquity of planar faults,

Wadsley defects, recurrent twinning, coherent intergrowths (all of which have been touched upon in previous volumes of these reports) are strikingly apparent. Necessarily, several classes of minerals, notably the feldspars, have had to be omitted in this survey. We plan to repair this omission in a future report.

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