

would be no need for books like the one under review.

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Low-Energy Electrons and Surface Chemistry

G. Ertl, J. Küppers

251 pp. Verlag Chemie, Weinheim, West Germany, 1974. DM 98.00

This book is intended to introduce one to the lengthy concatenation of techniques that employ low-energy electrons to study surfaces. The authors, who have contributed extensively to our knowledge of surface physics and chemistry, have themselves used many of the methods described.

In a little over a decade, the astonishing growth of solid-state electronics has diminished technological interest in the solid-vacuum interface; this interest has been replaced by concern over phenomena occurring at solid-solid interfaces. Meanwhile our response to the new economics of energy is tempered, in such areas as electrochemistry and catalysis, by our limited understanding of solid-liquid and solid-gas interfaces. Yet, it is the solid-vacuum interface that is the primary focus of a burgeoning basic-research effort. The reason is simply that the exposed surface is accessible to the sort of poking and probing that enables us to understand better the force laws governing all interfaces.

The most convenient and versatile probe of the solid surface is the low-energy electron. The change in momentum of an electron elastically scattered from a surface, for example, can provide information on the arrangement of its atoms. Energy losses of backscattered electrons, on the other hand, provide information on such diverse phenomena as vibrational modes of surface atoms, collective oscillations of the valence-electron fluid, and excitations of core-electron states, depending on the energy range involved. These methods have in common a sensitivity to the surface region that is a consequence of the short mean free path for inelastic scattering of low energy electrons. For electron energies of 50 to 100 eV, this mean free path may be only a few Ångströms. It is a perverse fact, however, that the very inelastic damping that enables us to restrict our view to the surface region renders that view highly distorted, and a complete theoretical analysis of the data is not yet possible. The clear recognition of the limitations this imposes is perhaps the strongest virtue of this book. This

is indeed much the best book available covering these topics; its generally uniform treatment is a great improvement over the inadequately edited collections of chapters by separate authors that have appeared.

Events, of course, take no heed of publishing schedules, and it is inevitable in a flourishing field that reviews will be out of date before the ink dries. There is, for example, no mention of developments in angular-resolved photoemission, or of electron-stimulated desorption-ion angular distributions. Although one should be aware of the possibly brief lifetime of conclusions in this field, there are few experts who would not profit by a few hours spent with this little book.

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Van der Waals Attraction (Springer Tracts in Modern Physics, Vol. 72)

D. Langbein

145 pp. Springer-Verlag, New York, 1974.
\$31.90

This monograph provides a comprehensive account of the theory of forces between macroscopic bodies, a subject which Dieter Langbein (Battelle Laboratories, Frankfurt and University of Frankfurt) is well qualified to examine: His papers, particularly on the attractions of spheres, are well-known, and he has previously reviewed aspects of the theory in an article (1973) that is the apparent origin of the present monograph. His previous research interests include investigation of transport phenomena in magnetic fields and band-structure calculations, and more recent interests include microscopic theories of electromagnetic-wave propagation in solid surfaces.

The book can be conveniently divided into four sections. The first gives a self-contained qualitative description of fields of applications and theoretical approaches and develops the theory of nonretarded attraction between pairs of microscopic or macroscopic bodies at the absolute zero of temperature on the basis of the so-called "oscillator" model. In the second section, Langbein develops the theory of pair interactions at finite temperatures on the basis of both the fluctuation approach and the oscillator model. He also attacks the important question of the effects of multiplet interactions and applies both microscopic and macroscopic approaches to the treatments of various geometries, including spheres, cylinders, half spaces



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