BOOK REVIEW

Surface Self—Diffusion of Metals

by G. Neumann and G. M. Neumann. Diffusion Information Center. Switzerland and Ohio, 1972. Pp 132 ; US $ 15.00.

The present volume is the no. 1 of the Diffusion Monograph series which are going to be published in several volumes. The present book incorporates in it a complete and authorititive account of the present state of our knowledge on atomic transport on metal surfaces. The volume deals with : (1) experimental methods which are being employed to these studies, namely sintering experiments, field—electron—emission microscopy, mass transfer techniques, radioactive tracer methods, field-ion-emission microscopy and comparative assessment of various methods ; (2) systematic arrangement of all experimental data on orientation dependence of the surface diffusion coefficient, effect of impurity absorption on the surface diffusion mobility and critical phenomenological analysis of these data ; (3) different models proposed for the structure of metal surface ; and (4) analysis of available data and theories with a view to understanding the mechanism of surface—transport by diffusion.

The book is therefore a valuable and useful handbook for all theoretical and experimental workers engaged in the investigation on surface diffusion in solids.

A. K. D.

Solving problem in Physics, Dynamics, Electricity and Magnetism

by E. W. Laing & W. McFarlane; Oliver and Boyd, Edinburgh, Pp. 156, £ 1.75.

This is the third book of a series edited by E. W. Laing intended to help the students to deepen their understanding in the general principles and ideas of classical physics through problem solving. In fact, the present book is a collection of problems appropriate for Honours and first year Post-graduate classes of our universities. The importance of working out problems in learning physics cannot be overemphasized. In view of that quite a good number of worked

out problems have been arranged in this book in order of their increasing complexities before each exercies enabling the students thereby to solve other problems by themselves. The method emphasised by the authors is undoubtedly helpful but evidently not comprehensive. The book will be useful to the students as an aid to a general standard text book.

The book contains two sections, one dealing with Dynamics and the other with Electricity and Magnetism. The first one includes examples and problems on certain aspects of generalised coordinates, small oscillations, vector dynamics of rigid bodies and Euler's equations. The second section contains four chapters on electrostatics, magnetistatics and currents in extended media, magnetic fields of currents and interaction between circuits, motion of charged particles in electric and magnetic field and electromagnetic waves. MKS units have been used throughout.

A. N. B.

G. Ayrault and G. Ehrlich, Surface self â€” diffusion on an fcc crystal: an atomic view, J. Chem. Phys. 60, 281 (1974).ADSCrossRefGoogle Scholar. 21. G. Ehrlich and F. G. Hudda, Atomic view of surface self â€” diffusion: Tungsten on tungsten, J. Chem. Phys. 44, 1039 (1966).ADSCrossRefGoogle Scholar.Â G. Ehrlich and K. Stolt, Surface diffusion of metal clusters on metals, in Growth and Properties of Metal Clusters, edited by J. Bourdon (Elsevier, Amsterdam, 1980), p. 1.Google Scholar. 73. S. C. Wang and G. Ehrlich, Cluster motion on metals: Ir on Ir(111), J. Chem. The diffusion behavior in GNS metals is crucial for understanding the diffusion mechanism and relative characteristics of different interfaces that provide fundamental understanding for advancing the traditional surface alloying processes. In this paper, atomic diffusion, reactive diffusion, and surface alloying processes are reviewed for various metals with a preformed GNS surface layer. We emphasize the promoted atomic diffusion and reactive diffusion in the GNS surface layer that are related to a higher interfacial energy state with respect to those in relaxed coarse-grained samples. 8. Surface Diffusion. Assistant: Dr. Enrico Gnecco NCCR Nanoscale Science. Random-Walk Motion. â€¢ Thermal motion of an adatom on an ideal crystal surface: - Thermal excitation the adatom can hop from one adsorption site to the next. â€¢ Mean square displacement at time t: âˆ†r 2 = Î½a2t. a = jump distance; Î½ = hopping frequency. (Note that Î½t = number of hops!)Â â€¢ Electric current through the sample Directional atomic motion on the surface â€¢ Self-electromigration Changes in the step structure â€¢ Hetero-electromigration Mass transfer towards catode or anode. Experimental Techniques. 1) Direct observation: â€¢ Field ion microscopy (FIM). â€œimage-anneal-imageâ€ technique - Limited to refractory or noble metal surfaces. â€¢ Scanning tunneling microscopy (STM) â€œimage-while-hotâ€ technique. Surface diffusion of atoms is an important phenomenon in areas of materials processing such as thin-film growth and sintering. Self-diffusion (that is, diffusion of the atoms of which the surface is comprised) has been much studied on clean metal and semiconductor surfaces 1 , 2 . But in most cases of practical interest the diffusion happens on surfaces partly covered by atoms and molecules adsorbed from the gas phase. Adsorbed hydrogen atoms are known to be capable of both promoting and inhibiting self-diffusion 3,4,5,6,7 , offering the prospect of using adsorbed gases to control growth or si Surface diffusion is a general process involving the motion of adatoms, molecules, and atomic clusters (adparticles) at solid material surfaces. The process can generally be thought of in terms of particles jumping between adjacent adsorption sites on a surface, as in figure 1. Just as in bulk diffusion, this motion is typically a thermally promoted process with rates increasing with increasing temperature. Many systems display diffusion behavior that deviates from the conventional model of nearest