

Landolt-Börnstein
Group III: Condensed Matter

Volume 24
Physics of Solid Surfaces

Subvolume C
Interaction of Charged Particles and Atoms with Surfaces

| | | |
|-------------|--|-----|
| | Introductory material | |
| 1 | General introduction (G. CHIAROTTI) | 1 |
| 1.1 | Motivations for a Landolt-Börnstein volume on surface physics | 1 |
| 1.2 | Outline of the volume | 2 |
| 1.3 | How to consult the volume | 12 |
| 1.4 | List of frequently used symbols and abbreviations | 13 |
| 1.5 | Conversion tables | 20 |
| 1.6 | Crystal structures and bulk lattice parameters of materials quoted in the volume | 21 |
| 1.7 | References for 1 | 27 |
| 2 | See Vol. 24A | |
| 3 - 5 | See Vol. 24B | |
| 6 | Interaction of charged particles with surfaces | 29 |
| 6.1 | Elastic scattering and diffraction of electrons and positrons (E. ZANAZZI) | 29 |
| 6.1.1 | Introduction | 29 |
| 6.1.1.1 | Definitions and historical layout | 29 |
| 6.1.1.2 | The diffraction of electrons and positrons | 30 |
| 6.1.1.3 | Experimental considerations | 31 |
| 6.1.1.4 | Diffraction theories and methods | 34 |
| 6.1.1.4.1 | LEED | 35 |
| 6.1.1.4.1.1 | Alternative methods using LEED | 37 |
| 6.1.1.4.1.2 | Simplifications and calculations | 38 |
| 6.1.1.4.1.3 | The scattering potential in LEED | 39 |
| 6.1.1.4.1.4 | The effect of temperature | 40 |
| 6.1.1.4.1.5 | Structure determination | 40 |
| 6.1.1.4.1.6 | Precision and reliability | 42 |
| 6.1.1.4.2 | VLEED | 43 |
| 6.1.1.4.3 | SPLEED | 44 |
| 6.1.1.4.4 | RHEED | 45 |
| 6.1.1.4.5 | LEPD | 47 |
| 6.1.1.5 | Clean surfaces | 47 |
| 6.1.2 | Data | 48 |
| 6.1.3 | Appendix | 86 |
| 6.1.4 | References for 6.1 | 88 |
| 6.2 | Inelastic scattering of electrons (M. ROCCA) | 113 |
| 6.2.1 | Introduction | 113 |
| 6.2.1.1 | Preliminary remarks | 113 |
| 6.2.1.2 | The EELS experiment | 113 |
| 6.2.1.3 | EEL-spectrometer designs | 115 |
| 6.2.1.4 | Inelastic cross section | 119 |

| | | |
|-----------|--|-----|
| 6.2.1.4.1 | Dipole scattering | 119 |
| 6.2.1.4.2 | Impact scattering | 123 |
| 6.2.2 | Data | 126 |
| 6.2.2.1 | Metals and semimetals | 126 |
| 6.2.2.1.1 | Surface phonons | 126 |
| 6.2.2.1.2 | Surface plasmons | 129 |
| 6.2.2.1.3 | Electron-hole pair and Stoner excitations | 141 |
| 6.2.2.2 | Semiconductors | 150 |
| 6.2.2.2.1 | III-V semiconductors | 150 |
| 6.2.2.2.2 | Si and Ge | 156 |
| 6.2.2.3 | Insulators and oxides | 166 |
| 6.2.3 | References for 6.2 | 171 |
| 6.3 | Elastic and inelastic scattering of ions (P. ALKEMADE) | 176 |
| 6.3.1 | Introduction | 176 |
| 6.3.1.1 | Preliminary remarks | 176 |
| 6.3.1.2 | Low energy ion scattering | 176 |
| 6.3.1.2.1 | Scattering phenomena | 177 |
| 6.3.1.2.2 | Charge exchange | 178 |
| 6.3.1.2.3 | Surface structure determination | 178 |
| 6.3.1.3 | Medium and high energy ion scattering | 179 |
| 6.3.1.3.1 | Channeling, shadowing and blocking | 180 |
| 6.3.1.3.2 | Surface structure determination | 180 |
| 6.3.2 | Data | 181 |
| 6.3.3 | References for 6.3 | 261 |
| 7 | Interaction of atoms with surfaces (V. CELLI) | 278 |
| 7.1 | Introduction | 278 |
| 7.1.1 | Preliminary remarks | 278 |
| 7.1.2 | Elastic scattering: the atom-surface potential | 279 |
| 7.1.2.1 | Kinematics and resonant scattering | 280 |
| 7.1.2.2 | Semi-empirical atom-surface potentials | 280 |
| 7.1.2.3 | Hard wall models | 281 |
| 7.1.2.4 | Theory of the elastic atom-surface potential | 283 |
| 7.1.2.4.1 | The static repulsive potential | 283 |
| 7.1.2.4.2 | The static attractive potential | 284 |
| 7.1.2.4.3 | The total static potential | 285 |
| 7.1.3 | Inelastic scattering: surface phonons | 286 |
| 7.1.3.1 | Kinematics | 286 |
| 7.1.3.1.1 | Kinematic focussing | 287 |
| 7.1.3.2 | Dynamical theory | 288 |
| 7.1.3.2.1 | The distorted wave Born approximation (DWBA) | 288 |
| 7.1.3.2.2 | Relation to phonon density of states and correlation functions | 290 |
| 7.1.3.3 | The inelastic atom-surface interaction | 290 |
| 7.1.3.3.1 | The dynamic repulsion and the cutoff factor | 291 |
| 7.1.3.3.2 | Dynamical effects of the attractive potential | 291 |
| 7.2 | Phonon spectra and surface potential data | 292 |
| 7.3 | References for 7 | 323 |

General index (See Vol. 24D)

Introduction

Index of surfaces



<http://www.springer.com/978-3-540-56071-5>

Interaction of Charged Particles and Atoms with
Surfaces

1995, XII, 328 p., Hardcover

ISBN: 978-3-540-56071-5