Springer Handbook of Condensed Matter and Materials Data

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Springer Handbook of Condensed Matter and Materials Data

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With 1025 Figures and 914 Tables

Springer

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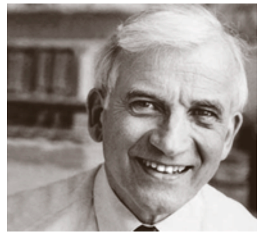
Preface

The Springer Handbook of Condensed Matter and Materials Data is the realization of a new concept in reference literature, which combines introductory and explanatory texts with a compilation of selected data and functional relationships from the fields of solid-state physics and materials in a single volume. The data have been extracted from various specialized and more comprehensive data sources, in particular the Landolt–Börnstein data collection, as well as more recent publications. This Handbook is designed to be used as a desktop reference book for fast and easy finding of essential information and reliable key data. References to more extensive data sources are provided in each section. The main users of this new Handbook are envisaged to be students, scientists, engineers, and other knowledge-seeking persons interested and engaged in the fields of solid-state sciences and materials technologies.

The editors have striven to find authors for the individual sections who were experienced in the full breadth of their subject field and ready to provide succinct accounts in the form of both descriptive text and representative data. It goes without saying that the sections represent the individual approaches of the authors to their subject and their understanding of this task. Accordingly, the sections vary somewhat in character. While some editorial influence was exercised, the flexibility that we have shown is deliberate. The editors are grateful to all of the authors for their readiness to provide a contribution, and to cooperate in delivering their manuscripts and by accepting essentially all alterations which the editors requested to achieve a reasonably coherent presentation.

An onerous task such as this could not have been completed without encouragement and support from the publisher. Springer has entrusted us with this novel project, and Dr. Hubertus von Riedesel has been a persistent but patient reminder and promoter of our work throughout. Dr. Rainer Poerschke has accompanied and helped the editors constantly with his professional attitude and very personable style during the process of developing the concept, soliciting authors, and dealing with technical matters. In the later stages, Dr. Werner Skolaut became a relentless and hard-working member of our team with his painstaking contribution to technically editing the authors' manuscripts and linking the editors' work with the copy editing and production of the book.

We should also like to thank our families for having graciously tolerated the many hours we have spent in working on this publication.



Prof. Werner Martienssen

Prof. Hans Warlimont

We hope that the users of this Handbook, whose needs we have tried to anticipate, will find it helpful and informative. In view of the novelty of the approach and any possible inadvertent deficiencies which this first edition may contain, we shall be grateful for any criticisms and suggestions which could help to improve subsequent editions so that they will serve the expectations of the users even better and more completely.

September 2004 — Werner Martienssen,
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Contents

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List of Abbreviations

2D-BZ	2-dimensional Brillouin zone
2P-PES	2-photon photoemission spectroscopy

A

AES	Auger electron spectroscopy
AFM	atomic force microscope
AISI	American Iron and Steel Institute
APS	appearance potential spectroscopy
ARUPS	angle-resolved ultraviolet photoemission spectroscopy
ARXPS	angle-resolved X-ray photoemission spectroscopy
ASTM	American Society for Testing and Materials
ATR	attenuated total reflection

B

BBZ	bulk Brillouin zone
BIPM	Bureau International des Poids et Mesures
BZ	Brillouin zone

C

CB	conduction band
CBM	conduction band minimum
CISS	collision ion scattering spectroscopy
CITS	current imaging tunneling spectroscopy
CMOS	complementary metal–oxide–semiconductor
CODATA	Committee on Data for Science and Technology
CVD	chemical vapour deposition

D

DFB	distributed-feedback
DFG	difference frequency generation
DOS	density of states
DSC	differential scanning calorimetry
DTA	differential thermal analysis

E

EB	electron-beam melting
ECS	electron capture spectroscopy
EELS	electron-energy loss spectroscopy
ELEED	elastic low-energy electron diffraction
ESD	electron-stimulated desorption
EXAFS	extended X-ray absorption fine structure

F

FEM	field emission microscope/microscopy
FIM	field ion microscope/microscopy

G

GMR	giant magnetoresistance

H

HAS	helium atom scattering
HATOF	helium atom time-of-flight spectroscopy
HB	Brinell hardness number
HEED	high-energy electron diffraction
HEIS	high-energy ion scattering/high-energy ion scattering spectroscopy
HK	Knoop hardness
HOPG	highly oriented pyrolytic graphite
HPDC	high-pressure die casting
HR-EELS	high-resolution electron energy loss spectroscopy
HR-LEED	high-resolution LEED
HR-RHEED	high-resolution RHEED
HREELS	high-resolution electron energy loss spectroscopy
HRTEM	high-resolution transition electron microscopy
HT	high temperature
HTSC	high-temperature superconductor
HV	Vicker's Hardness

I

IACS	International Annealed Copper Standard
IB	ion bombardment
IBAD	ion-beam-assisted deposition
ICISS	impact ion scattering spectroscopy
ICSU	International Council of the Scientific Unions
IPE	inverse photoemission
IPES	inverse photoemission spectroscopy
ISO	International Organization for Standardization
ISS	ion scattering spectroscopy
IUPAC	International Union of Pure and Applied Chemistry

J

JDOS	joint density of states

K

KRIPES K-resolved inverse photoelectron spectroscopy

L

LAPW linearized augmented-plane-wave method
LB Langmuir–Blodgett
LCM liquid crystal material
LCP liquid crystal polymer
LCs liquid crystals
LDA local-density approximation
LDOS local density of states
LEED low-energy electron diffraction
LEIS low-energy ion scattering/low-energy ion scattering spectroscopy
LPE liquid phase epitaxy

M

MBE molecular-beam epitaxy
MD molecular dynamics
MEED medium-energy electron diffraction
MEIS medium-energy ion scattering/medium-energy ion scattering spectroscopy
MFM magnetic force microscopy
ML monolayer
MOCVD metal-organic chemical vapor deposition
MOKE magneto-optical Kerr effect
MOSFET MOS field-effect transistor
MQW multiple quantum well

N

NICISS neutral impact collision ion scattering spectroscopy
NIMs National Institutes for Metrology

O

OPO optical parametric oscillation

P

PDS photothermal displacement spectroscopy
PED photoelectron diffraction
PES photoemission spectroscopy
PLAP pulsed laser atom probe
PLD pulsed laser deposition
PSZ stabilized zirconia
PZT piezoelectric material

R

RAS reflectance anisotropy spectroscopy
RE rare earth
REM reflection electron microscope/microscopy
RHEED reflection high-energy electron diffraction
RIE reactive ion etching
RPA random-phase approximation
RT room temperature
RTP room temperaure and standard pressure

S

SAM self-assembled monolayer
SAM scanning Auger microscope/microscopy
SARS scattering and recoiling ion spectroscopy
SAW surface acoustic wave
SBZ surface Brillouin zone
SCLS surface core level shift
SDR surface differential reflectivity
SEM scanning electron microscope
SEXAFS surface-sensitive EXAFS
SFG sum frequency generation
SH second harmonic
SHG second-harmonic generation
SI Système International d'Unités
SIMS secondary-ion mass spectroscopy
SNR signal-to-noise ratio
SPARPES spin polarized angle-resolved photoemission spectroscopy
SPIPES spin-polarized inverse photoemission spectroscopy
SPLEED spin-polarized
SPV surface photovoltage spectroscopy
SQUIDS superconducting quantum interference devices
SS surface state
STM scanning tunneling microscope/microscopy
STS scanning tunneling spectroscopy
SXRD surface X-ray diffraction

T

TAFF thermally activated flux flow
TEM transmission electron microscope/microscopy
TFT thin-film transistor
TMR tunnel magnetoresistance
TMT thermomechanical treatment
TOF time of flight
TOM torsion oscillation magnetometry

TRS	truncation rod scattering
TTT	time-temperature-transformation

U

UHV	ultra-high vacuum
UPS	ultraviolet photoemission spectroscopy
UV	ultraviolet

V

VBM	valence band maximum
VLEED	very low-energy electron diffraction

X

XPS	X-ray photoemission spectroscopy