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This **Springer Handbook of Metrology and Testing** presents the principles of Metrology – the science of measurement – and the methods and techniques of Testing – determining the characteristics of a given product – as they apply to chemical and microstructural analysis, and to the measurement and testing of materials properties and performance, including modelling and simulation.

The principal motivation for this Handbook stems from the increasing demands of technology for measurement results that can be used globally. Measurements within a local laboratory or manufacturing facility must be able to be reproduced accurately anywhere in the world.

The book integrates knowledge from basic sciences and engineering disciplines, compiled by experts from internationally known metrology and testing institutions, and academe, as well as from industry, and conformity-assessment and accreditation bodies.

The Commission of the European Union has expressed this as there is no science without measurements, no quality without testing, and no global markets without standards.

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Springer Handbook of Metrology and Testing (Springer Handbooks) From Springer Bibliography

- Sales Rank: #3806735 in Books
- Published on: 2011-09-23
- Original language: English
- Number of items: 1
- Dimensions: 9.80" h x 2.30" w x 8.10" l, 5.85 pounds
- Binding: Hardcover
- 1500 pages

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Editorial Review

From the Back Cover

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The Handbook is organized in five parts. Part A: Fundamentals of Metrology and Testing. Part B: Chemical and Microstructural Analysis. Part C: Materials Properties Measurement. Part D: Materials Performance Testing. Part E: Modeling and Simulation Methods.

Key Topics

Metrology Principles and Organization

Methodologies of Measurement and Testing

Analytical Chemistry Methods

Microstructural and Nanoscopic Analyses

Materials Properties Measurement: mechanical, thermal, electrical, magnetic, optical

Materials Performance Testing: Corrosion, friction and wear, biogenic, environmental

Nondestructive Testing

Reliability Evaluation

Modeling and Simulation Methods: molecular dynamics simulation, finite element methods, Monte Carlo simulation

Features

Develops and explains guidelines and standards for Quality of Measurement and Testing

Sampling

Traceability of Measurement and Testing

Statistical Evaluation of Results

Accuracy and Uncertainty of Measurement

Validation

Inter-laboratory Comparisons and Proficiency Testing

Reference Materials

Reference Procedures

Human Aspects in a Laboratory

International Standards, Laboratory Accreditation and Global Trade

About the Author

Dr. Horst Czichos has been President of BAM, the German Federal Institute for Materials Research and Testing (1992-2002) and President of EUROLAB, the European Federation of National Associations of Measurement, Testing and Analytical Laboratories (1999-2003). He holds degrees in precision engineering, physics and materials science from the Free University and the Technical University of Berlin, and obtained a Dr. h.c. from KU Leuven University for his research work in tribology. He is currently Professor of Mechatronics at the University of Applied Sciences, BHT Berlin, and received 2007 the Beuth Award for achievement in engineering education.

Dr. Saito is currently Senior Adviser Emeritus at the National Institute for Materials Science (NIMS) and has served as Chair of ISO/TC164 (Mechanical Testing of Metals) for nine years. He received his Dr.-Eng from the University of Tokyo in 1978 and since has held various positions at the National Research Institute for Metals, including Director of Materials Evaluation Division and Deputy Director-General of the Institute.

After retirement from his position as Director of the Materials Science and Engineering Laboratory of the National Institute of Standards and Technology (NIST) **Dr. Leslie Smith** is a Research Associate at NIST. He received B.S. and Ph.D. degrees from Case Institute of Technology and the Catholic University of America in physical-organic chemistry and conducted research primarily on the adsorption of polymers and the degradation of polyesters.

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Michael Chapman:

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