



# Experimental Techniques in Materials and Mechanics

By C. Suryanarayana

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**Experimental Techniques in Materials and Mechanics** By C. Suryanarayana

**Experimental Techniques in Materials and Mechanics** provides a detailed yet easy-to-follow treatment of various techniques useful for characterizing the structure and mechanical properties of materials. With an emphasis on techniques most commonly used in laboratories, the book enables students to understand practical aspects of the methods and derive the maximum possible information from the experimental results obtained.

The text focuses on crystal structure determination, optical and scanning electron microscopy, phase diagrams and heat treatment, and different types of mechanical testing methods. Each chapter follows a similar format:

1. Discusses the importance of each technique
2. Presents the necessary theoretical and background details
3. Clarifies concepts with numerous worked-out examples
4. Provides a detailed description of the experiment to be conducted and how the data could be tabulated and interpreted
5. Includes a large number of illustrations, figures, and micrographs
6. Contains a wealth of exercises and references for further reading

Bridging the gap between lecture and lab, this text gives students hands-on experience using mechanical engineering and materials science/engineering techniques for determining the structure and properties of materials. After completing the book, students will be able to confidently perform experiments in the lab and extract valuable data from the experimental results.

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## **Editorial Review**

### **Review**

This book covers the main characterization tools for materials mechanics, phase analysis by x-ray diffraction and microstructure analysis in a comprehensive and exhaustive way. In addition, steel is presented as a practical example, covering phase transitions and common heat treatments. [It is] easy to read and understand for a beginner's level, including examples and questions for practicing and control.

?Thomas Klassen, Helmut-Schmidt-University Hamburg, Germany

... beneficial for undergraduate students in developing their concepts related to the experimental techniques in materials and mechanics.

?Soon-Jik Hong, Kongju National University

### **About the Author**

**C. Suryanarayana** is a professor of materials science and engineering in the Department of Mechanical, Materials and Aerospace Engineering at the University of Central Florida. Dr. Suryanarayana is a fellow of ASM International and the Institute of Materials, Minerals and Mining (UK). He has published over 330 technical papers and according to Thomson Reuters, is one of the top 40 materials scientists with the highest citation impact scores for papers published since 2000. His research focuses on rapid solidification processing, mechanical alloying, innovative synthesis/processing techniques, metallic glasses, superconductivity, quasicrystals, and nanostructured materials.

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#### **Shane Webb:**

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