



Nanoengineering of Structural, Functional and Smart Materials

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In chapters contributed by 24 university & government laboratories, **Nanoengineering of Structural, Functional, and Smart Materials** combines wide-ranging research aimed at the development of multifunctional materials that are strong, lightweight, and versatile. This book explores promising and diverse approaches to the design of nanoscale materials and presents concepts that integrate mechanical, electrical, electrochemical, polarization, optical, thermal, and biomimetic functions with nanoscale materials to support the development of polymer composites, thin films, fibers, pultruded materials, and smart materials having a superior combination of properties.

Interrelating the many different aspects of nanoscience vital to developing new material systems, this book is organized into three parts that cover the major areas of focus: synthesis, manufacturing techniques, and modeling. The book defines functional materials and discusses techniques designed to improve material properties, durability, multifunctionality, and adaptability. It also examines sensors and actuators fabricated from nanostructured microdevices for structural health and performance monitoring. Shifting its focus to nanomechanics and the modeling of nanoscale particles, the book discusses vibration properties, thin films, and pulse laser deposition, low cost manufacturing of ceramic composites, hybrid nanocomposites, and various types of nanotubes. The book combines atomistic modeling with molecular dynamics simulations to clarify design considerations and discusses coupling between atomistic models and classical continuum mechanics models. The authors also advocate the current and potential development of commercial applications, such as nanocoatings to create “artificial skin” and functionalized nanotubes used to enhance the properties of composite materials.

Nanoengineering of Structural, Functional, and Smart Materials provides an overview of current trends and cutting-edge research in the area of nanoengineered materials. It offers new directions for the production of functionally tailored materials that can self-monitor their health and provide enduring performance.

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