



Integrated Design of Multiscale, Multifunctional Materials and Products

David L. McDowell, Jitesh Panchal, Hae-Jin Choi, Carolyn Seepersad, Janet Allen, Farrokh Mistree

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Integrated Design of Multiscale, Multifunctional Materials and Products is the first of its type to consider not only design of materials, but concurrent design of materials and products. In other words, materials are not just selected on the basis of properties, but the composition and/or microstructure is designed to satisfy specific ranges of performance requirements. This book presents the motivation for pursuing concurrent design of materials and products, thoroughly discussing the details of multiscale modeling and multilevel robust design and provides details of the design methods/strategies along with selected examples of designing material attributes for specified system performance. It is intended as a monograph to serve as a foundational reference for instructors of courses at the senior and introductory graduate level in departments of materials science and engineering, mechanical engineering, aerospace engineering and civil engineering who are interested in next generation systems-based design of materials.

Key Features:

- * First of its kind to consider not only design of materials, but concurrent design of materials and products.
- * Treatment of uncertainty via robust design of materials
- * Integrates the "materials by design approach" of Olson/Ques Tek LLC with the "materials selection" approach of Ashby/Granta
- * Distinguishes the processes of concurrent design of materials and products as an overall systems design problem from the field of multiscale modeling
- * Systematic mathematical algorithms and methods are introduced for robust design of materials, rather than ad hoc heuristics--it is oriented towards a true systems approach to design of materials and products

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