

Nanoscale Structure and Assembly at Solid-Fluid Interfaces

Volume I: Interfacial Structures versus Dynamics, Volume II: Assembly in Hybrid and Biological Systems

The aim of this reference is to take us to the root of these issues: the solid-fluid interfacial structures and the basic interactions between structural units that determine the kinetics of nano particles and assembly formation, and subsequently the resulting structures and functionalities of the nano phases and devices. By taking a fresh look at the novel nano structure engineering and surface probing technologies from a global viewpoint of fundamental principles, the two volumes of this book direct our focus from the macroscopic phase to the nano structures ranging from inorganic to bio nano materials. Featuring contributions from a number of international experts in the related fields, this book offers a comprehensive and synergistic look into these challenging issues in terms of theoretical modeling, computer simulations, advanced surface probing and fabrication and interface characterizations. The book also provides a link to the nanostructure engineering of some novel materials playing an important role in advancing technologies in this field.

All of us have read about the vast potential inherent in nanotechnology and the exciting impact it has had in changing our lifestyle in the 21st century. One of the basic issues confronting us is how to fabricate devices or materials on the nano scale. What is the basic physics governing the formation of nano phases? How can biological systems inspire us to formulate nano scale architectures, in the way nature has always done and continues to do? These are two main areas of focus in this book. The aim of this reference is to take us to the root of these issues: the solid-fluid interfacial structures and the basic interactions between structural units that determine the kinetics of nano particles and assembly formation, and subsequently the resulting structures and functionalities of the nano phases and devices. By taking a fresh look at the novel nano structure engineering and surface probing technologies from a global viewpoint of fundamental principles, the two volumes of this book direct our focus from the macroscopic phase to the nano structures ranging from inorganic to bio nano materials. Featuring contributions from a number of international experts in the related fields, this book offers a comprehensive and synergistic look into these challenging issues in terms of theoretical modeling, computer simulations, advanced surface probing and fabrication and interface characterizations. The book also provides a link to the nanostructure engineering of some novel materials playing an important role in advancing technologies in this field. Volume I focuses on both the theoretical and experimental aspects of crystal surfaces and solid-fluid interfacial structures, the effect of ordering and disordering of the interfacial molecules on the kinetics of crystalline matter, and in particular on the nano crystalline phase and the formation of self-organized nanofiber networks. Expertly written chapters expand the existing knowledge on surface/interfacial structures associated with bulk phases to the micro/nano structural domain, presenting examples of the characterization and manipulation of self-organized nano structures. The subject matter covers also the principles and technologies concerning nano phases, surface/interface structure formation and characterization, and fabrication. Volume II is devoted to the assembly of bio-related nano structures and hybrid nano materials and systems. The part on bio-related nanostructures focuses on the aggregation and pattern formation of protein molecules, or biomaterials in the bulk and on the surface of designated substrates. The way to control the process of biomineralization, biological matrices, hierarchical structures and other bio-related materials by relying on robust methods, such as templating, AFM, Chemoselective Ligation, scanning probe nanolithography will also be treated in detail. In addition, innovative techniques to engineer complex nano structures such as molecular design and molecular self assembly are highlighted.



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