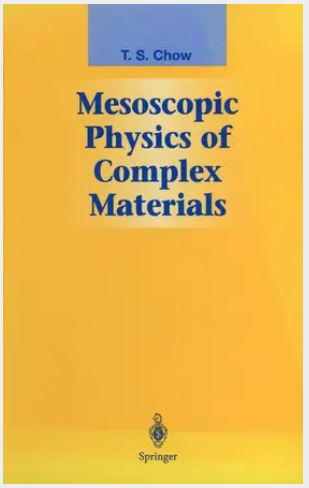
Chow

Mesoscopic Physics of Complex Materials



This book is intended to provide a cross-disciplinary study of the physical prop erties of complex fluids, solids, and interfaces as a function of their mesoscopic structures. Because of the disorder and dissipate nature of these structures, em phasis is placed on nonequilibrium phenomena. These phenomena are the active research areas of soft condensed matter, and it is impossible to cover them all in one book. Therefore, we have limited the scope by selecting a variety of important current systems that (I) present high values to both science and technology on the basis of my own preference and expertise and (2) have not been put together coherently in the form of a book. We then show the underlying connections and parallels between topics as diverse as critical phenomena in colloidal dynamics, glass state relaxation and deformation, reinforced polymer composites, molecular level mixing in nanocomposites, and microscopic interactions of rough surfaces and interfaces. At the same time, each chapter is designed to be directly accessible to readers, and the need for going through the previous chapters has been kept to the minimum. It is a reasonably short book that is not designed to review all of the recent work that spans many disciplines. Instead, we attempt to establish a general framework for the fundamental understanding and the practical development of new materials that cannot be designed by the trial-and-error methods.

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74,89 €
69,99 € (zzgl. MwSt.)

Kurzfristig nicht lieferbar, wird unverzüglich nach Lieferbarkeit versandt.

Artikelnummer: 9780387950327
Medium: Buch
ISBN: 978-0-387-95032-7
Verlag: Springer Netherlands
Erscheinungstermin: 25.08.2000
Sprache(n): Englisch
Auflage: Erscheinungsjahr 2000
Serie: Graduate Texts in Contemporary Physics
Produktform: Gebunden
Gewicht: 420 g
Seiten: 196

Kundenservice Verlag Dr. Otto Schmidt KG
Neumannstraße 10, 40235 Düsseldorf | kundenservice@otto-schmidt.de | 0221-93738-997 (Inland)