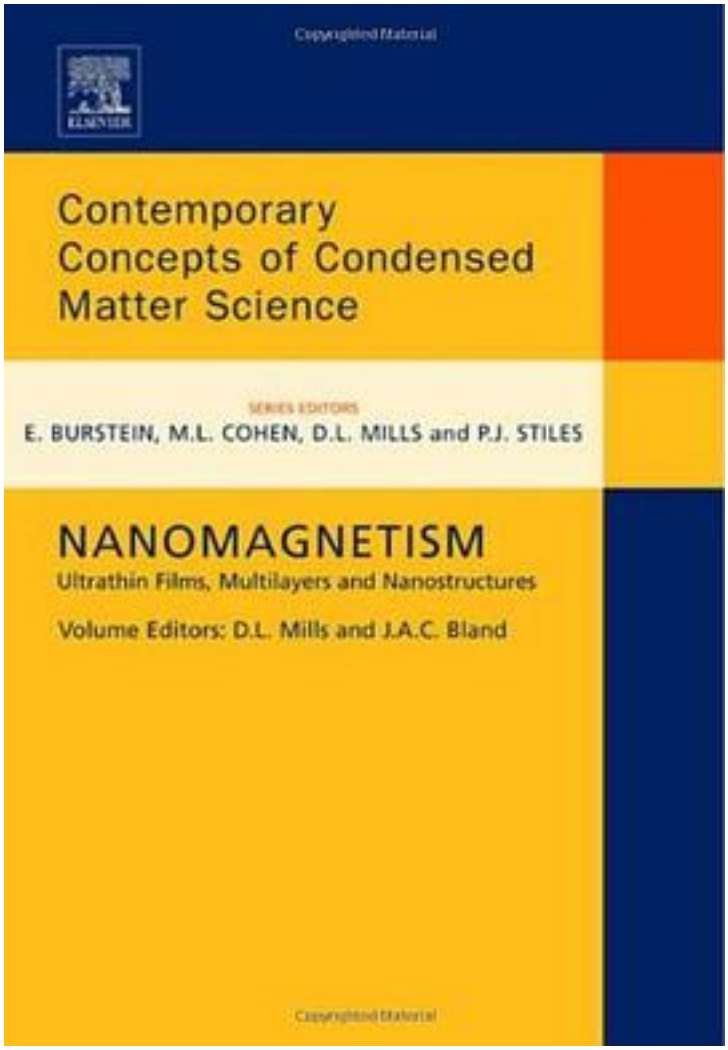
Nanomagnetism



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Nanoscience is of central importance in the physical and biological sciences and is now pervasive in technology. However nanomagnetism has a special role to play as magnetic properties depend uniquely on both dimensionality and lengthscales. Nanomagnetism is already central to data storage, sensor and device technologies but is increasingly being used in the life sciences and medicine. This volume aims to introduce scientists, computer scientists, engineers and technologists from diverse fields to this fascinating and technologically important new branch of nanoscience. The volume should appeal to both the interested general reader but also to the researcher wishing to obtain an overview of this fast moving field. The contributions come from acknowledged leaders in the field who each give authoritative accounts of key fundamental aspects of nanomagnetism to which they have themselves made a major contribution. After a brief introduction by the editors, Wu first surveys the fundamental properties of magnetic nanostructures. The interlayer exchange interactions within magnetic multilayer structures is next discussed by Stiles. Camley then discusses the static, dynamic and thermal properties of magnetic multilayers and nanostructures, followed by an account of the phenomenon of exchange anisotropy by Berkowitz and Kodama. This latter phenomenon is widely in current read head devices for example. The transport properties of nanostructures also are spectacular, and again underpin computer technology, as we see from the discussion of giant magnetoresistance (GMR) and tunnelling magnetoresistance (TMR) presented by Fert and his colleagues. Beyond GMR and TMR we look to the field of spintronics where new electronic devices are envisioned and for which quantum computing may depend as discussed in the chapter by Flatte and Jonker. The volume concludes with discussion of the recently discovered phenomenon of current induced switching of magnetization by Edwards and Mathon. This subject is in the forefront of nanoscience. All Section authors are leading figures in this key field. Presentations are accessible to non specialists, with focus on underlying fundamentals.

作者介绍:

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