Interfaces in High- T_c Superconducting Systems

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Editors

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With 129 Figures

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Preface

Over the past six years, the field of high-temperature superconductivity has advanced at a very rapid rate. Continued growth of this field demands more focused studies of various issues vital to the understanding and application of high-temperature superconductors. One key area of study is the structure and properties of interfaces involving these complex materials. Interfaces in superconducting systems include naturally occurring microstructural features, such as grain boundaries, twin boundaries, and interphase boundaries, as well as artificially fabricated boundaries, such as substrate–superconductor interfaces and heterostructures, as well as interfaces in composites. These interfaces critically affect the superconducting properties, and their understanding is crucial to the development of both bulk and thin-film applications of high-temperature superconductors.

This volume attempts to cover a part of this fascinating field. The initial chapters describe the nucleation and growth of thin films, including the important aspects of defect generation and their distribution. Defects in thin films and bulk materials (especially grain boundaries) are covered next with a discussion of the relationship between the defect morphology and the superconducting properties. The authors have used techniques like transmission electron microscopy (TEM) and scanning tunneling microscopy (STM) for this purpose. The substrate–superconductor and metal contact–superconductor interfaces are described in the following chapters. It is believed that the interaction of the first few monolayers of metal atoms with the superconductor surfaces dominates the nature of the contact. X-ray photoelectron spectroscopy has been used for these studies. Finally, superconducting properties of single and multiple grain-boundary junctions are discussed. This involves detailed electrical characterization. Despite the continued developments in the above areas since the conception of this book, it is hoped that the concepts outlined here by noted scientists will endure.

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SUBHASH L. SHINDÉ

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