Computational Methods and Experiments in Materials Characterisation III

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MATERIALS CHARACTERISATION

MATERIALS CHARACTERISATION 2007

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Preface

In an age of dwindling resources, knowledge of the behavior of materials takes on an even more important role than was traditionally the case. Not only must a material perform its basic function, but it must do so while satisfying constraints given by ecology, economy, safety and durability.

Alongside the science of traditional materials, new areas are emerging. At the very small scale, materials are being engineered down to their very microstructure, sometimes even their molecular structure. These microengineered materials promise exceptional performance, however it becomes increasingly difficult to characterize their structure and behavior with traditional methods. In many cases, characterization occurs by indirect means, requiring a computer model to interpret the measurement data to finally recover the material properties sought, for example in the case of nanoindentation of heterogeneous materials. In some cases, it is even difficult to define a property, or at what scale it applies. The second recent trend in materials science is the re-emergence of traditional and natural materials, sometimes in combination with more 'conventional' ones, as in the case of natural fibre reinforced composites. These pose particular challenges, as their microstructure and properties can be even more complex than in synthetic materials.

The characterization of materials is an extremely broad topic, which could mean different things to different people. We have, nevertheless, endeavoured to structure the book in a logical manner. It comprises three broad areas: papers focusing on the materials and their microstructures, papers focusing on experimental characterization techniques, and papers focusing on computational methods. As in the previous two conferences, we are confident that cross-pollination of ideas and methodologies will occur, leading to new collaboration and new research paths.

As always, the editors wish to thank the authors for contributing their work, and the scientific advisory committee in particular, for their help with obtaining and selecting many quality articles.

The Editors
Bologna, Italy
2007

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