Preface

This book is composed of a synthesis research and innovation activities focused on the conception and design of advanced, multi-functional materials based on polymers, and on the applied modeling and numerical simulation of materials, structures and industrial processes.

The unifying theme of the work presented here is the relationship process-structure-property relationships of different materials. The objectives relate on the one hand the relationship between the processing of materials, the development of their microstructures and their functional properties useful across a range of applications and other performance improvement of existing materials and the development of new materials with new functionalities, some approaches are presented in the following:

Metallic foam processing, powder metal processing, laser processing, fabrication of novel photonic glass fibers and surface engineering are all advanced materials processing techniques used to create specific materials and material combinations. The optimization of processing techniques and the effects of processing parameters on material structure and properties forms,

A key part of some work is to characterize the structure of materials and link this to their properties and performance, from the Nano to the macroscopic scale.

The development of new materials with specific properties is discussed such as metal hydride systems. Other active areas of research include in this volume is the surface engineering to locally enhance properties: electro deposition, electrostatic spray assisted vapor deposition (ESAVD) and aerosol assisted chemical vapor deposition. This includes creating metallic glass coatings with high strength and corrosion resistance, cermet coatings with good wear resistance, as well as functional thin films and Nano composite coatings.

The work presented here is characterized by a synthesis of experimental research and numerical modeling of the mechanical behavior of materials at different length scales, and the application of models developed to analyze structural parts.

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Guest Editors