Preface

Polymer composites and nano-composite materials constitute a rapidly evolving field in science where they find a wide range of applications in each and every phase of our life as: packaging materials, automotive, health care, electronics, aerospace, mechanical engineering, construction and building

- Polymer composite materials are defined as a multi-component material comprising multiple different phase domains in which at least one type of phase domain is a continuous phase (polymer matrix) and the second is the fillers (fibers, plates, particles,..).

- Polymer nanocomposites are materials in which at least one of the phases has at least one dimension of the order of nanometers, or structures having nano-scale repeat distances between the different phases that make up the material.

Recently, the interest to the polymer nanostructured multiphase systems, is increasing due to their unique properties. The incorporation of only a few percent of nanosized particles such as carbon nanotubes, layered graphite nanofillers etc. may induce an important property changes. Polymer materials reinforced with micro and nanoscale components are therefore adding to the new materials and major improvements in functional and structural properties are within reach.

Several researchers in fields of Polymer physic, chemistry and engineering show great interest for developing high-performance of polymer micro and nanocomposites systems i.e. : improved barrier properties, fire resistance, strength…

The Conference on Multiphase Polymers and Polymer Composites Systems: Macro to Nano Scales was organized at Paris-Est Créteil University, France on June 7-10, 2011. This conference has been organized within the framework of the COST action MP0701 on Polymer and nonocomposites. This conference was dedicated to many of the recent research accomplishments in the area of physical and interfacial properties of multiphase polymer composites and nanocomposite systems.
The content of the conference was unique since a particular attention was focused to the different length scales (macro, micro and nano) relevant for a deep understanding of the structure-property relationships of nanocomposite materials. This event covered the major findings and observations in the field of morphological, interfacial, physical and thermophysical properties of multiphase polymers and polymer composite systems from macro to nano length scales.

The conference was organized around three areas:

1. Multiscale modeling and simulation

2. Design and advanced characterization

3. Processing, application and recycling

Out of 160 oral and poster presentations given at the conference in June 2011, we have selected some of these papers after peer reviewing for publication in Materials Science Forum

Dr. Abderrahim BOUDENNE
CERTES, Université Paris-Est Créteil Val de Marne
61 Avenue du Général de Gaulle
94010 Créteil Cedex, France
email: boudenne@u-pec.fr

Scientific Committee

- **Prof. James E. Mark, USA**
  Area: Nanoparticle Reinforcement of Elastomers and Some Other Types of Polymers
- **Prof. Philippe Dubois, Belgium**
  Area: Polymer Nanocomposites From Renewable Bioresources
- **Prof. Sabu Thomas, India**
  Area: Manufacturing and Mechanical Characterization of Polymer Composite Systems
- **Prof. Esmaiel Jabbari, USA**
  Area: Macro, Micro and Nano Mechanics of Polymer Composite Systems
- **Prof. Friederike Schmid, Germany**
  Area: Theory and Simulation of Multiphase Polymers and Polymer Composite Systems
- **Prof. Polycarpos Pissis, Greece**
  Area: Dielectric Spectroscopy of Polymer Composite Systems
- **Prof. Mohamed Chehimi, France**
  Area: XPS Studies of Polymer Composite Systems
- **Prof. György J. Marosi, Hungary**
  Area: Interfaces and Thermal analysis of Multiphase Polymers and Polymer Composite Materials
- **Prof. Han-Xiong Huang, China**
  Area: Macro, Micro and Nanostructured morphologies of Polymer Composite Systems
- **Prof. Antonio Martinez Richa, Mexico**
  Area: NMR Spectroscopy of Multiphase Polymers and Polymer Composite Systems
- **Prof. Srecko Valic, Croatia**
  Area: ESR Spectroscopy of Multiphase Polymers and Polymer Composite Systems
- **Prof. Guangxian Li, China**
  Area: Light Scattering Studies of Multiphase Polymers and Polymer Composite Systems
- **Prof. Max Wolff, Germany**
  Area: Characterization of Multiphase Systems by Neutron Scattering
- **Prof. José-Marie Lopez Cuesta, France**
  Area: Recycling of Polymer Composite Systems
- **Prof. Antxon Santamaria, Spain**
  Rheology and Viscoelastic Properties of Polymer Composite Materials
- **Dr. Cédric Lorthioir, France**
  Area: NMR of Polymers and Polymer Composite Materials
- **Dr. Fouad Laoutid, Belgium**
  Flame Resistant of Composites Systems
- **Prof. Eliane Espuche, France**
  Area: Diffusion in Multiphase Polymer Systems
- **Dr. Zhongyi Zhang, UK**
  Area: Non-Destructive Testing of Composite Materials
- **Dr. Igor Krupa, Slovakia**
  Area: Electrical Properties of Polymer Composite Materials
- **Dr. Júlio C. Viana, Portugal**
  Area: X-Ray Scattering Studies of Polymer Composite System

Sponsors

This work is part of an ongoing activity within the COST action MP0701 on Polymer and Composites Materials “Multicomponent polymer and polymer composites systems from macro to nano scale materials". The Editor would like to thank all partners that have sponsored this book:

COST: European Cooperation in Science and Technology

UPEC : Paris-Est Créteil Val de Marne University

Conseil Géréral du Val de Marne