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Molecular Crystals and Liquid Crystals

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Guest Editors' Foreword

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Guest Editors' Foreword

This special issue contains selected papers presented at the XIth International Conference on “Frontiers of Polymers and Advanced Materials (11th ICFPAM): *Emerging Technologies and Business Opportunities*” held in Pretoria, South Africa, 22–27 May 2011. The conference was a sequel to the very successful series of international meetings held in Santiago de Chile (Chile, 2009), Krakow (Poland, 2007), Cancun (Mexico, 2005), Bucharest (Romania, 2003), Pernambuco (Brazil, 2001), Poznan (Poland, 1999), Cairo (Egypt, 1997), Kuala Lumpur (Malaysia, 1995), Jakarta (Indonesia, 1993) and in New Delhi (India, 1991).

The International Union of Pure and Applied Chemistry (IUPAC) and the United Nations Educational, Scientific, and Cultural Organization (UNESCO), have declared 2011 as the International Year of Chemistry (IYC 2011) (www.chemistry2011.org). The IYC 2011 commemorated the achievements of chemistry and its contributions to humankind. The achievements include how chemists and other scientists work to protect the environment; develop lifesaving new medicines; create cleaner, greener and more sustainable sources of energy; and design new materials for cars, buildings, electronics as products, medical implants and a host of other products. The 11th ICFPAM Conference highlighted these achievements and formed an official part of both the national and the international IYC celebrations. The University of Pretoria in conjunction with the South African Council organized the conference for Scientific and Industrial Research (CSIR). The IYC 2011 initiative involved chemical societies, academies and institutions worldwide, and relies on individual initiatives to organize local and regional activities. In support of this call, the 11th ICFPAM conference theme was to *Celebrate the contribution of Chemistry as an enabling science for polymers and advanced materials*.

The 11th ICFPAM conference focused on the most recent and important progress in the field of advanced materials, their science and technology and in new business opportunities resulting from the recent technological developments. Similarly to the preceding meetings, the conference held in Pretoria benefited from a wide international attendance, gathering around 320 participants coming from 44 countries, representing all continents.

The main conference objectives were:

- To highlight advances and new findings in polymers and advanced materials and their impact on new technologies;
- To facilitate technology transfer and new business opportunities by bringing together representatives from academia, research centers, industries and business;
- To foster international collaborations and joint ventures;
- To facilitate the growth of private sector business;
- To promote the growth of scientific and technical infrastructure in the field of polymers and advanced materials technologies.

The presentations at the conference were split into ten symposia:

- (i) General and tutorial lectures on New Materials and Advanced Manufacturing Technologies (Chairs: Prof. F. Kajzar, Politehnica University of Bucharest,

- Romania & Angers University, France; Prof. K.-S. Lee, Hannam University, Korea; Prof. Aurelia Meghea, University Politehnica of Bucharest, Bucharest, Romania)
- (ii) Advanced Nanoscale And Nanostructured Materials (Chairs: Prof. W. W. Focke, Institute of Applied Materials, University of Pretoria, South Africa; Prof. Maria Zaharescu, Institute of Physical Chemistry, Romanian Academy of Sciences, Bucharest, Romania)
 - (iii) Natural Fibres, Composites and Environmentally Friendly Materials (Chairs: Dr. R. Anandjiwala, CSIR, Materials Science and Manufacturing, Department of Textile Science, South Africa; Prof. R. Kozłowski, Institute for Engineering of Polymer Materials and Dyes (IMPIB), Torun, and ESCORENA Focal Point at INF&MP, Poland)
 - (iv) Advanced Materials and Nanostructures in Electrochemistry: Energy Storage and Conversion, Electrocatalysis and Electroanalysis (Chairs: Dr. K. Ozoemena, CSIR, South Africa; Dr. G. Bidan, CEA Grenoble, France)
 - (v) Synthesis and Chemistry of Polymer Nanocomposites (Chairs: Dr. F. J. W. J. Labuschagne, University of Pretoria; Prof. A. Pron, CEA Grenoble, France; Prof. M. Zagorska, Warsaw University of Technology, Poland)
 - (vi) Laser Processing and Photonics: Advanced Materials and Composites for Photonics (Chairs: Prof. A. Forbes, (Coordinator) National Laser Centre, CSIR, Pretoria, South Africa; Prof. A. Miniewicz, Wrocław University of Technology, Poland)
 - (vii) Fluorochemical Materials, Engineering, and Technologies (Chair: Prof. P. Crouse, University of Pretoria, South Africa)
 - (viii) Biomaterials Africa 2011 (Chairs: Dr. S. Moolman, Polymers & Composites, CSIR, South Africa; Prof. I. Rau, University Politehnica of Bucharest, Romania)
 - (ix) Carbon-Based Materials: Graphene, Carbon Nanotubes, Diamonds and Graphite (Chairs: Dr. N. Manyala, SARCHI Chair in Carbon Technology and Materials, University of Pretoria, South Africa; Prof. W. Blau, Trinity College Dublin, Ireland; Prof. B. Rand, SARCHI Chair in Carbon Technology and Materials, University of Pretoria, South Africa)
 - (x) Challenges and Opportunities for Materials Research in Africa (Chair: Dr. J. Zimba, President: Africa Materials Research Society)

Almost 200 papers were presented during the oral sessions as keynote, plenary, invited and contributed contributions. More than 150 posters were presented during poster session. Distinguished scientists and representatives of U.S. Air Force, European and Asian research institutions and speakers representing industry, gave invited plenary lectures on interdisciplinary topics.

This volume is a collection of selected and refereed papers presented at the conference. The typical presentation is multidisciplinary, containing a blend of chemistry, physics, materials processing and technology applications. The result is a comprehensive overview of polymer-related topics including innovative synthetic techniques, nanostructured materials for photonics and optics, multi-functional polymers, new composite, exotic, hybrid materials, sol-gels, device applications and environmental friendly materials and technologies. Both review and research papers are included. The review papers should assist in the cross-fertilization of different areas and training of young researchers, while the research papers will serve as useful reference materials summarizing the status of individual topics and projecting future developments and future trends.

We wish to thank the various institutions, agencies and corporations which provided support for the conference: AEL Mining Services (www.explosives.co.za); Biomaterials Association of South Africa (BioMatASA) (www.biomatasa.org.za); Council for Scientific and Industrial Research (CSIR) (www.csir.co.za); CSIR Materials Science and Manufacturing; South African Department of Science and Technology (www.dst.gov.za); Element Six (www.e6.com); European Office of Aerospace Research and Development, Air Force Office of Scientific Research, United States Air Force Research Laboratory (www.london.af.mil); Institute of Applied Materials, University of Pretoria; International Society of Electrochemistry (www.ise-online.org); International Union of Pure and Applied Chemistry (IUPAC) (www.iupac.org); Metrohm South Africa (Pty) Ltd (www.metrohm.co.za); Mintek (www.mintek.co.za); National Laser Centre, CSIR; National Research Foundation (NRF) (www.nrf.ac.za); Pelchem (www.pelchem.co.za); Sasol Polymers (www.sasol.com); South African Institution of Chemical Engineers (www.saiche.co.za); Taylor & Francis Group (www.taylorandfrancisgroup.com), and the University of Pretoria (UP) (www.web.up.ac.za).

We would like to warmly thank the conference Honorary Chair Prof. Paras N. Prasad from University of Buffalo, USA, who started this series of conferences and organized previous very successful meetings for his continuous interest, support and help in its organization. Thanks are also due to the conference co-chairs: Prof. R. Kozlowski, Institute for Engineering of Polymer Materials and Deyes, Toruń and FAO/Escorena, Poland, Prof. K.-S. Lee, Hannam University, Taejon, Korea, Prof. J. E. Mark, Univ. of Cincinnati, USA, and as well as the International Coordinator Dr. J. Grote from Wright Patterson Labs, USA. Thanks are also due to the members of the International Program Committee, chaired by Prof. R. Rowell, USDA Forest Service, USA and the International Advisory Committee, chaired by Prof. A. Meghea from University POLITEHNICA of Bucharest, for all helpful suggestions, selection of keynote and invited speakers as well as oral and poster contributions. The success of this conference is in large measure due to their inputs. The next conference will take place in 2013 in New Zealand.

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