Foreword

This volume contains papers presented at the 4th International Conference on Electrophoretic Deposition: Fundamentals and Applications, held on October 2-7, 2011, at CasaMagna Marriott Hotel, Puerto Vallarta, Mexico, under the sponsorship of Engineering Conferences International (ECI).

This was the fourth of the successful conference series that initiated in 2002 in Banff, Canada. The conferences in this series are the only international meetings focusing entirely on electrophoretic deposition (EPD) as a materials processing tool for fabrication of both traditional and advanced materials, with an increasing emphasis in nanomaterials. The conference attracted over 50 contributed talks and 31 posters from participants from 21 countries. Contributions covering a large number of topics related to EPD were presented reflecting the wide variety of fields in which EPD is being successfully applied, which, in turn, demonstrates the versatility of the EPD technique as a materials processing technique. The topics ranged from theoretical and numerical studies on the fundamental mechanisms of EPD to novel technological developments and advanced experimental methods in EPD for efficient and cost-effective fabrication of a variety of materials and structures. The program was organized in 15 technical sessions, 2 poster sessions, and a final discussion session.

The papers included in this volume report on the successful application of EPD to the synthesis of a wide variety of engineering materials and components, which include free standing ceramic deposits, ceramic and composite coatings on metallic substrates, functional films, microelectronic substrates, carbon nanotube and bioactive coatings, piezoelectric devices and solid oxide fuel cells. The application of EPD for the manufacture of near net-shape components exhibiting accurate dimensions is also addressed, including EPD manufacturing of nanoparticle heterostructures and densely packed nanostructured functional films. A few papers also explored the production of ceramics and ceramic coatings by EPD and the integration of EPD in manufacturing technologies of more or less complex components. There is increasing interest in the use of alternating current and pulsed electric fields for manipulating nanoparticles and for production of ceramic deposits from aqueous suspensions without bubble evolution. EPD techniques employing high dc electric fields, coupled electric and magnetic fields as well as pulsed electric fields are reported, and approaches to the deposition of carbon nanotube films, bacterial cells and bioactive coatings are also included in this volume.

The conference confirmed the highly promising potential of EPD as materials processing method. The progress and expansion of EPD to novel applications will necessitate further investigations on both fundamental variables affecting the process and on integrating EPD in established manufacturing technologies. The EPD conference series provides an excellent forum to tackle these issues and indeed the motivation for the organisation of these conferences is to foment the continuing interactions and exchanges within the EPD community. The conference in Mexico was the largest of the series so far, which attracted some of the most recognised EPD experts. The present volume will constitute a valuable source of information for those whose research interests are in the EPD field coming from different materials sectors, including basic material development, nanomaterials, colloidal processing and electrochemistry, both in industry and academia.

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