Applications

Macro to Nanoscales

Editors

Sabu Thomas, PhD Nandakumar Kalarikkal, PhD Weimin Yang, MD Snigdha S. Babu





BIOMATERIAL APPLICATIONS

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BIOMATERIAL APPLICATIONS

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LIST OF ABBREVIATIONS

AD Aldehyde

BC Bacterial Cellulose

BMSC Bone Marrow Stem Cell

BS Barbated Skullcup
BT Biotechnology

CABG Coronary Artery Bypass Graft

CB Conduction Band CNF Cellulose Nanofibres

CNMB Center for Nanoscale Materials and Biointegration

CNW Cellulose Nanowhiskers

COWP1 Cryptosporidium (oo)cysts Wall Protein 1

CT Chemically Treated CVD Cardiovascular Disease

DBSA Dodecylbenzenesulfonic Acid

DEA Diethanolamine
DEAA Diethylacrylamide

DLVO Derjaguin, Landau, Verwey and Overbeek

DMAA Dimethylacrylamide
DNA Desoxyribonucleic Acid

DSC Differential Scanning Calorimetry
DTG Derivative Thermogravimetric
dUTP Deoxynucleotidyl Transferase

EC Endothelial Cell EPS Exopolysaccharides

e-PTFE Expanded Poly Tetra Flourethylene

FGF Fibrinogen Growth Factor FTIR Fourier-Transform Infrared

Gf Grams-force

HAEC Human Aortic Endothelial Cell

HCAEC Human Coronary Artery Endothelial Cell HUVSMCs Human Umbilical Vein Smooth Muscle Cells

ICAM Intercellular Adhesion Molecule

ICR Information Collection Rule IMS Immunomagnetic Separation

IPN Interpenetrating Polymer Network

IT Information Technology
LAB Lactic Acid Bacteria
LRR Leucine Rich Repeats

LUMO Lowest Unoccupied Molecular Orbital

MA Methacrylate

MCC Microcrystalline Cellulose
MFC Microfibrillated Cellulose

NIR Near Infra Red
NPs Nanoparticles
NT Nanotechnology
OP Oxygen Permeability

OTR Oxygen Transmission Rate

PCL Polycaprolactone

PCR Polymerase Chain Reaction

PDO Polydioxanone

PEG Poly (Ethylene Glycol)
PGA Poly Glycolic Acid
PGC Polyglecaprone
PLA Poly Lactic Acid

PMBU Phosphorylcholine-co-Methacryloyloxyethyl Butyl-

urethane

PO Plant Oils

POH Prepared Hybrid Materials

PPy Polypyrrole PU Polyurethane

QMRA Quantitative Microbial Risk Assessment

SEM Scanning Electron Microscopy

SERS Surface-Enhanced Raman Scattering sHPMC Silylated Hydroxypropylmethycellulose

SIS Small intestinal sin mucosa

SMC Smooth Muscle Cell SNR Signal-to-Noise Ratio

STM Scanning Tunneling Microscopy
TEM Transmission Electron Microscopy

TEOS Tetraethoxy Orthosilane

TGA	Thermograv	imetric Analysis
		2 2 5 5 5

TPF Turmeric Petiole Fiber

US Ultrasound

UTM Universal Testing Machine

VEGF Vascular Endothelial Growth Factor WAXD Wide Angle X-Ray Diffraction

WVP Water Vapor Permeability

and the second second

PREFACE

Natural polymers and biomaterials have always played a very important role in our lives, and the research in this field has increased tremendously over the last few decades and has led to many technological and commercial developments. ICNP 2012 - Third International Conference on Natural Polymers, Bio-Polymers, Bio-Materials, Their Composites, Blends, IPNs, Polyelectrolytes and Gels: Macro to Nano Scales took place at Mahatma Gandhi University, Kottayam, Kerala, India, on October 26, 27, and 28, 2012. It was jointly organized by Beijing University of Chemical Technology, China. The conference aimed to emphasize interdisciplinary research on processing, morphology, structure, and properties of natural polymers, biomaterials, biopolymers, their blends, composites, IPNS, and gels from macro to nano scales and their applications in medicine, automotive, civil, chemical, and aerospace, computer, and marine engineering. During the three-day conference, distinguished scientists specializing in various disciplines discussed recent advances, difficulties, and breakthroughs in the field of natural polymers and biomaterials. The conference included keynote addresses, a number of plenary sessions, invited talks and contributed lectures focusing on the diverse aspects of natural polymers and biomaterials. It included discussions on recent advances, difficulties, and breakthroughs in the field of natural polymers and biomaterials. Bio-macromolecules, bio-polymers, bio-materials, natural polymers, biocomposites, bio-nanocomposites, micro and nano blends based on natural polymers, bio-degradable polymers, interphases in composites and blends, IPNs, rheology of natural polymers, processing of natural polymers, degradation and stabilization of natural polymer systems, biomass, recycling of natural polymers were among the wide array of topics covered in the conference. Additionally, there was a poster session with more than 50 posters to encourage budding scientists and researchers in this field. The conference had over 200 delegates from all over the world.

This book, titled *Biomaterial Applications: Macro to Nano Scales*, is a collection of chapters from the delegates who presented their papers

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during the conference. The book chapters include a wide variety of topics in natural polymers, biomaterial, composites, and their applications.

We appreciate the efforts and enthusiasm of the contributing authors for this book, and acknowledge those who were prepared to contribute but were unable to do so at this time. We trust that this book will help in stimulating new ideas, methods, and applications in the dynamic area of research. The guest editors are Dr. Sabu Thomas, International and Inter University Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam, India; Dr. Yang Weimin, Beijing University of Chemical Technology, China; Dr. Nandakumar Kalarikkal, International and Inter University Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam, India; and S. Snigdha, International and Inter University Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam, India.

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-Dr. Sabu Thomas