Advanced Polymeric Materials

From Macro- to Nano-Length Scales

Editors
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Maciej Jaroszewski
Josmine P. Jose

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LIST OF ABBREVIATIONS

ACN	acetonitrile
AFM	atomic forced microscopy
AIBN	2,2'-azobisisobutyronitrile
AMPSA	2-Acrylamido-2-methyl-1-propanesulfonic acid
ANOVA	analysis of variance
BOPP	biaxially oriented PP film
CAN	ceric ammonium nitrate
CAS-g-PAM	poly acrylamide grafted casein
CBD	chemical bath deposition
CHL	chloroform
CIE	Commission Internationale d'Eclairage
CIF 1	Central Instrumentation Facility
CPM	chlorpheniramine maleate
CSIR	Council of Scientific and Industrial Research
CVD	chemical vapor deposition
DFT	density functional theory
DMA/DMTA	dynamic mechanical (or thermal) analysis
DMF	N,N-Dimethyl formamide
DMSO	dimethyl sulphoxide
DOE	design of experiments
DSC	differential scanning calorimetry
DSMO	dimethylsulfoxide
DST	Department of Science and Technology
EG	ethylene glycol
EGDMA	ethylene glycol dimethacrylate
EL	electroluminescence
EMI	electromagnetic interference
FF	fill factor
FGF-2	fibroblast growth factor-2
FT-IR	fourier transform infrared spectrometer

FTO	fluorine-doped tin oxide
GLCM	gray-level co-occurrence matrix
GPC	gel permeation chromatography
HA	hydroxyapatite
HDPE	high density polyethylene
HTGPC	high temperature gel permeation chromatography
IA	itaconic acid
IPN	interpenetrating polymeric network
IR	infrared spectroscopy
KETEP	Korea Institute of Energy Technology Evaluation and Planning
LDPE	low density polyethylene
LINCS	linear constraint solver
LLDPE	linear low density polyethylene
MAA	methacrylic acid
MADM	multi attribute decision making
MD	molecular dynamics
MESER	Molecular Environmental Science and Engineering Research
MFI	melt flow index
MIPs	molecularly imprinted polymers
MMP-2	matrix metalloproteases-2
MRSA	methicillin-resistant Staphylococcus aureus
MSA	methanesulfonic acid
MSD	mean square displacement
MVR	melt volume rate
MWD	molecular weight distribution
NIPs	non-imprinted polymers
NMR	nuclear magnetic resonance
OFETs	organic field-effect transistors
OLEDs	organic light-emitting diodes
OPLS	optimized potentials for liquid simulations
OPVs	photovoltaic devices
PALS	positron annihilation lifetime spectroscopy
PAM	poly acrylamide
PAN	polyacrylonitrile

PANi	polyaniline
PBS	phosphate buffer solution
PC	poly carbonate
PCM	polarized continuum model
PEG	polyethylene glycol
PEI	polyethylenimine
PEN	polyethylene naphthalate
PET	poly ethylene terephthalate
PL	photoluminescence
PLED	polymer light emitting diodes
PME	particle mesh Ewald
PMMA/SAN	poly (methyl methacrylate)/poly (styrene acrylonitrile)
PP	polypropylene
PPC	pre-polymerization complex
PVC	poly vinyl chloride
PVP	poly(vinyl pyrrolidone)
S	sulfur
SAD	selected-area diffraction
SCF	self-consistent field theory
SCS	semiconductor characterization system
SDS	sodium dodecyl sulfate
SE	shielding effectiveness
SEM	scanning electron microscope
SILAR	successive ionic layer adsorption and reaction
TDS	total dissolved solid
TEM	transmission electron microscope
TSS	total suspended solid
USEPA	United States Environmental Protection Agency
VRE	vancomycin-resistant enterococci
WHO	World Health Organization
WVTR	water vapor transmission rate
XIS	xylene insoluble
XPS	X-ray photoelectron spectroscopy
XRD	X-ray diffraction
XS	xylene soluble

PREFACE

The field of advanced polymer materials has had the attention, imagination, and close scrutiny of scientists and engineers in recent years. This scrutiny results from the simple premise that, using building blocks with dimensions in the macro to nanoscale makes it possible to design and create new materials with unprecedented flexibility and improvements in their properties. The promise of nanocomposites lies in their multifunctionality, the possibility of realizing unique combinations of properties unachievable with traditional materials. The book is an attempt to cover the entire spectrum of advanced polymeric materials from macro to nanolength scales. We recognize that a book on a subject of such wide scope is a challenging endeavor and yet it is tried to introduce the recent research interests in the field of advanced polymeric materials.

The book entitled "*Advanced Polymeric Materials: From Macro- to Nano-Length* Scales" has 14 chapters. Chapter 1 deals with the polymer hydrogel dressing in wound management. Chapter 2 is about conducting solid polymer electrolyte membrane based on PVP and methanesulfonic acid. Chapter 3 outlines the novel multi-variable models for predicting the tensile and brittle strength of polymers. Chapter 4 discusses the dendritic organic semiconductors based on pyrene and triazine derivatives. In Chapter 5, rheological characteristics of LLDPE-fumed silica nanocomposites are discussed. Rational design of molecularly imprinted polymeric system is analyzed in Chapter 6. The EMI application of polymer/ferrite nanocomposites is outlined in Chapter 7. Chapter 8 is about the effect of speed ratio and cycle time on thickness of LLDPE products in rotational moulding process. Chapter 9 explains the molecular structure and property relationship of commercial biaxially oriented polypropylene. Chapter 10 deals with lead and cadmium ion removal by novel interpenetrating polymer-ceramic nanocomposites. Chapter 11 highlights the high performance polymeric flocculants based on modified milk protein—Microwave assisted synthesis. Chapter 12 is about polymer assisted synthesis of CdS nanostructure for photoelectrochemical solar cell applications and

synthesis and characterization chitosan-starch cross-linked beads is outlined in Chapter 13. Chapter 14 discusses the dendrimer polymer brushes and its significance.

We hope our readers will find the book of value to further their research interests in this fascinating and fast developing area of advanced polymeric materials.

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