

Frontiers of Macromolecular Science

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This book is the scientific proceedings of the 32nd International Symposium on Macromolecules (MACRO 88), held under the auspices of the International Union of Pure and Applied Chemistry, in Kyoto, Japan. It describes the current status of the progress of polymer science research. In addition to fundamental chemistry and physics of polymer science, high performance polymers and functional polymers, which are essential bases of the so-called 'advanced technologies' are emphasised in this book.

Contents

Plenary Lectures: Free radical ring-opening polymerization; Structure of homopolymers, block copolymers and polymer blends as revealed by neutron scattering; Future prospects for the polymer industry; Session 1: Polymerization Chemistry and Session 2: Synthesis of New Polymers and Polymer Reactions: Stereo- and conformational control in the synthesis of helical polymers: solid state measurements of optical activity; Asymmetric polymerization of methacrylates and optical resolution on the polymers; The origin of stereospecificity in -olefins polymerization with chiral catalytic systems; The fundamental concepts of polymer stereochemistry; Synthesis and stereocomplexation of stereoregular polyesters; Macromolecular design by living carbocationic techniques; Living cationic polymerization of vinyl monomers: control of propagating species with added bases; Metalloporphyrin catalysts for living and immortal polymerizations; Group transfer polymerization in macromolecular engineering of vinyl polymers; Anionic polymerization of vinyl silanes - route to the new family of polysilicon hydrocarbons; Advanced polymer properties: the new frontiers of the 'ideal' Ziegler-Natta catalysts; The polymerization of cyclic olefins with metathesis catalysts; Kinetic parameters for some individual steps in the metathesis polymerization of norbornene derivatives; Cationic ring-opening polymerization via activated monomer; Syntheses and ring-opening polymerizations of new cyclic monomers; Functional polymers on the basis of 2-oxazolines; Ring-opening polymerization of bicyclic oxalactams - Telechelics, macromers, and block and graft copolymers; Syntheses of polymers from functional oligomers prepared by ring-opening reaction; New polymers based on azlactone chemistry; Synthesis and polymerization reactions of poly--caprolactone containing di- and star block copolymers; Initiation and acceleration mechanisms in epoxy resin curing reactions involving model reactions; Alternating radical copolymerization; Reactivity and structure in radical

polymerization; ESR study of semicontinuous emulsion polymerization; Radiation chemistry of polymers; Photo-induced thermal degradation of some polymers: rate parameters for elementary processes; Telechelic oligomers; Synthesis and applications of macromonomers; Advances in heterophase copolymer synthesis; Development in functional elastomers; STARBURST dendrimers - Size, shape and surface control of macromolecules; Synthetic analogues of membrane proteins; Polyion interchange and recognition phenomena in interpolyelectrolyte complexes; Cationic/anionic monomers and polymers; Polymer-metal complex catalysts; Polymer-protected metal-complexes for gas-separation; Polymer matrices for organic synthesis; Session 3: Structure and Properties of Polymers: Structure and dynamics of polymers by infrared and Raman spectroscopy: state of the art; ²H NMR studies of oriented fluid phases; Modified Rouse-Zimm equations for dilute and entangled chain polymers; Single-chain conformation and dynamics; Configuration-dependent properties of polymers; Configuration and conformation of asymmetric polymers; Recent studies of rubberlike elasticity; Dynamic properties of polyelectrolyte solutions and concentration effects; Polydispersity in thermodynamic and kinetic considerations; Statistical thermodynamics of amorphous polymers: from melt to glass; Simulation of aggregating colloids in shear flow; Phase equilibrium in lyotropic liquid crystals; Patterns in gels undergoing phase transition; Adsorption and desorption behavior of polymers at an interface; Polymer-polymer interactions in solution as studied by fluorescent labeling techniques; Electron microscopy of thermotropic liquid crystalline polymers; NMR characterization of amorphous piezoelectric polymers; Session 4: High Performance Polymers: Structure development in high-strength polyethylene fibers; Recent developments in fluoropolymer chemistry; Modification of wholly aromatic polyamides for high performance materials; Thermoplastic glutarimide polymer; Multiphase polymer alloys; Structure of multiphase polymers; Thermoplastic alloys - a challenge to industrial research now and in years to come; Ultra-high impact composite materials; Liquid crystal polymers - XII New high performance plastics of trans-4,4'-stilbenedicarboxylic acid polyesters; Liquid crystalline behavior of wholly aromatic polyester; Session 5: Functional Polymers: Highly conducting polyacetylene: preparation of aligned cis-rich films in low-temperature nematic liquid crystals; Highly conducting polymers via soluble precursors; Molecular design of conjugated polymers for electrical and optical properties; Properties and application of organic photoconductive materials: molecular design of organic photoconductive polycyclic aromatic diimides compounds; Organic semiconducting polymers and oligomers for electronic devices; Novel vinylidene fluoride polymeric materials through regiodeflect control, isotopic substitution, and cocrystallization; Chemistry and physics of organic polymer ferromagnets; Approaches to the design of a novel macromolecular system with tailored optical properties; Preparation and nonlinear optical properties of novel polydiacetylenes; Recent development in plastic optical fibers; Novel polymeric imaging systems for

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448 illustrations

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Macromolecules is a peer-reviewed scientific journal that has been published since 1968 by the American Chemical Society. Initially published bimonthly, it became monthly in 1983 and then, in 1990, biweekly. Macromolecules is abstracted and indexed in Scopus, EBSCOhost, PubMed, Web of Science, and SwetsWise. The editor-in-chief is Marc A. Hillmyer. Its first editor was Dr. Field H. Winslow.

Frontiers of Macromolecular and Supramolecular Science is the name given to a symposium series created in 2008, under the name Frontiers of Macromolecular Science, and continued under the new extended name. This symposium is based only on invited plenary speakers and is held under the auspices of the Romanian Academy of Science, to celebrate the life and achievements of Professor Christofor I. Simionescu, who was Director of the Petru Poni Institute of Macromolecular Chemistry in Iasi, Romania, for 30 years (1970–2000).¹ Importantly, participating plenary speakers have included the leaders of macromolecular science from the USA, Europe, and Asia. We discuss a quantitative influence of macromolecular crowding on biological processes: motion, bimolecular reactions, and gene expression in prokaryotic and eukaryotic cells. We present scaling laws relating diffusion coefficient of an object moving in a cytoplasm of cells to a size of this object and degree of crowding. Such description leads to the notion of the length scale dependent viscosity characteristic for all living cells.²

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