

## Book Reviews

**The Organometallic Chemistry of Transition Metals** 2nd edition by Robert H. Crabtree, 487 pages, 70 figures, 16 tables, 663 references. John Wiley & Sons (1994) New York, Chichester, Brisbane, Toronto, Singapore. Hardcover: 49,5 £, ISBN 0-471-59240-4

A series of important industrial processes relies on organometallic chemistry and new ones are being developed. Beside some powerful new synthetic methods in organic chemistry there are links with biochemistry with the discovery of several metalloenzymes that involve organometallic intermediates. Transition metal ions can bind ligands (L) to give a coordination compound or complex  $ML_n$  ( $M = V, Cr, Mn, Fe, Co$  or  $Ni$ ).

After an introduction into the fundamental ideas of coordination chemistry which also apply to organometallic complexes, the following chapters deal with characterization of organometallic compounds, the carbenes, metathesis and polymerization; the activation of small molecules by  $CO$ ,  $CO_2$  and alkanes. The following chapters talk about clusters and the metal-metal bond. Applications of organic synthesis are presented: metalalkyls and hydrides; reduction oxidation and control of stereochemistry; protection and deprotection; reductive elimination; nucleophilic attack on a ligand and carbene reactions, followed by chapters on oxidation and high oxidation state complexes as well as bio-organometallic chemistry. The major reaction types dealt with in the book are summarized in an alphabetical list in the appendix.

The book is intended for senior undergraduate and graduate courses in organometallic chemistry. It is based on successful courses at Yale University. Beside that it is of great profit to chemists and physicochemists in research and development.

H. Domininghaus (Dreieich)

**Plastics from Microbes (Microbial Synthesis of Polymers and Polymer Precursors)** David P. Mobley (ed.) 269 pages, 93 figures 4 in full colour, 39 tables, 813 references. Hanser Publishers, Munich Vienna New York; Hanser/Gardner Publications Inc., Cincinnati (1994) Hardcover DM 128,-/ÖS 999,-/ SFr 129,-/ US \$ 79.95/ £ 52,-. ISBN 3-446-17367-6

Whilst the first carbon-based commercial products of the chemical industry, nearly two hundred years ago, were all obtained from living organisms, F. Wöhler was the first who succeeded in synthesizing an organic chemical (urea) from inorganic compounds. The plastics industry followed the same trend as the broader organic chemical industry and some of the earliest commercial plastics being derivatives of cellulose. Since the early twentieth century the development of new polymers has been dominated by synthetic organic chemistry as well.

During the last fifteen years research and development of plastics show some return of organic chemistry to its biological roots. The biotechnology considerably has been enhanced by genetic engineering. As a result the microbic and enzymatic processes are either in use or are being studied for

the production of a wider variety of materials such as agriculture chemicals, bulk chemicals and polymers.

Eighteen authors, mainly of the USA and UK, all specialists in microbial synthesis of polymers and polymer precursors present an overview of the state-of-the-art of technology in applying microbial processes to polymer synthesis.

After an introduction to the topics dealt with, comprehensive chapters on polyhydroxyalkanoates, microbial production of structural protein polymers, polymers of lactic acids, polyphenylenes from biosynthetic cis-dihydroxycyclohexadiene, biological production hydroxylated aromatic hydrocarbons and aromatic hydroxylation by *aspergillus* to make polymer precursors, e.g. bisphenol products of bioconversion can yield better polymers with better physical properties than the corresponding polymers from conventional bisphenols.

The study of this book is of great benefit to chemists, biochemists, physicists, physicochemists and chemical engineers.

H. Domininghaus (Dreieich)

**Recycle '94, Davos Global Forum and Exposition 7th Annual Forum**, organized by Maack Business Services, Plastics Technology and Marketing on March 14–18, 1994 in Davos/Switzerland 581 pages, 377 figures, 105 tables, 78 references Publisher: Maack Business Services, Moosacherstr. 14 Ch-8804 Au/Zürich (1994) Loose leaf binder DIN A4 SFr 650,-

One hundred and seventeen authors and co-authors presented 96 papers to the participants that came from 25 countries. These facts underline the worldwide importance of the MBS "Globul Forum" held every year in Davos.

The plenary session of the first day dealt with bio-recycling/compostables regarding packaging and serviceware. The following day had two parallel sessions discussing food/non-food packaging: products, marketing, reduction and recycling; life cycle and analysis; food/non-food packaging of plastics recycling and re-use; bottles and containers: detection and re-use; re-use of PVC; textiles, fibers, carpets and re-use of material; CFC replacement: industry, cleaning, refrigeration, foams; paper, board and parchment: re-uses, energy recycling. The plenary sessions of the following day brought lectures on global waste reduction and packaging regulations, environmental changes and producer responsibility; packaging directives, recycling corporate environmental law; feedstock recycling, raw material sense, feedstock recovery, mixed plastics and remarketing uses, electrical, electronics, DCs. On the next day another six papers were given: packaging, agricultural and industrial films re-utilization and filtration; automotive and industrial products; reduction and recycling advances; raw material re-utilization; energy recovery and city waste management, combustion technologies. The last morning session dealt with the limits of recycling and life cycle assessment.

This survey of topics shows the variety of this comprehensive problem, so that all specialists engaged in the recycling

activity -no matter how-will study this informative handbook with great benefit.

*H. Domininghaus (Dreieich)*

**Polyethelene '93 9th Annual International Conference**, organized by Maack Business Services, Plastics Technology and Marketing on Oct. 5-6-7, 1993 in Zürich/Switzerland. 435 pages, 245 figures, 74 tables, 60 references. Publisher: Maack Business Services, Moosacherstr. 14 CH-8804 Au/Zürich (1993) Loose leaf binder, DIN 4A SFr 650,-

The conference "Polyethelene '93" rounds off the selection of topics discussed at the PE '92 conference. 28 authors and co-authors presented 28 papers. Session I dealt with methylaluminoxane and other aluminosoxanes synthesis, PE film products from BP fluid bed process using metallocene catalysts whilst Session II brought papers on hexene LLDPE for stretch film and heavy duty sacks, LLDPE made via Phillips process and designed polymers with unique single site catalyst technology. HDPE applications and PE developments are discussed in Session III e.g. bi-modal HDPE grades. HDPE in US film markets and new trends in peelable packaging. Cycle management, productivity and recycle impact are the themes of Session IV. The LDPE market and LLDPE, VLDPE impact owing to the spherulene technology respectively by new high pressure technology are discussed in Session V. Problems of processing and quality control can be solved by studying the papers in Session VI. Modifiers and adhesives are presented in Session VII. Session VIII deals with laminated products regarding adhesive problems. Extrusion coated products put questions to the converter, they are answered in Session IX. Cross-laminated films, PE can carriers, multilayer barrier films as cast and blown films are presented in Session X.

Chemists, engineers, converters and end-users will welcome this comprehensive handbook.

*H. Domininghaus (Dreieich)*

**Polyethelene World Congress '92, Global Business, Changes, Monomers, Polymers, Markets and Applications** Organized by Maack Business Services, Plastics Technology and Marketing on Dec. 7-8-9, 1992 in Zürich/Switzerland: 489 pages, 312 figures, 45 tables, 126 references.

Publisher: Maack Business Services, Moosacherstr. 14, CH-8804 Au/Zürich (1992) Loose leaf binder DIN A4 SFr 650,-

There is no doubt, the handbook of this world congress presents the-state-of-the-art in a comprehensive manner. Session I comprises topics as: monomers, global supply/demand, feedstock and processing (advanced ethylene process), following in Session II phase behaviour of PE-monomer mixtures, advanced process control and taylormade initiators to improve high pressure LDPE-technology. Session III deals with low pressure PE and catalyst technology (metallocene catalysts). The topics on polymer modification and functionalization are discussed in Session IV such as chemically modified PE, PE modified by reaction processing, ethylene-vinylsilane copolymers and high pressure functional co-and terpolymers and reactor modified resins.

Papers on processing and conversion are presented in Session V, e.g. barrier screw for PE, processing aids, HDPE

for improved injection moulding, new flame retardant compounds for waste pipes, and technology trends for extrusion blow moulding. Global business and market aspects are the topics of Session VI followed by technology trends, stabilization advances and last but by no means least recycle impact in Session VII. This textbook is of mutual interest to chemists, engineers, converters, traders and end-users.

*H. Domininghaus (Dreieich)*

**Polypropylene '92 World Congress, Global Business Changes, Interpolymer Competition, Resins, Markets, Applications** organized by Maack Business Services, Plastics Technology and Marketing on Oct. 27-28, 1992 in Zürich/Switzerland; 456 pages, 276 figures, 70 tables, 62 references. Publisher: Maack Business Services, Moosacherstr. 14, CH 8804 Au/Zürich (1992) Loose leaf binder; DIN A4 SFr 650,-

Since the early days of production polypropylene has been used in many fields of plastics application. Continuing progress in research and development has opened new markets. The congress program comprised 30 lectures written by 51 authors and co-authors.

Session I dealt with the supply/demand scenario and the advanced ethylene progress. The papers of Session II were of current interest: recent polypropylene catalyst developments, metallocene PP, polypropylene reactor blends and flexible interface control in PP composites as well as flame retardant systems. Session III described the progress in stabilization, nucleation and modifications such as polymeric clarifying agents, high performance nucleators, TiO<sub>2</sub> as non-toxic, non-migrating, transparent uv-absorber and effective new ways for uv-stabilization of PP. Session IV dealt with packaging such as the use of random co-and terpolymers, biaxial film stretching and acrylic modification of PP for thermoforming. Session IV dealt with packaging such as the use of random co- and terpolymers, biaxial film stretching and acrylic modified PP for thermoforming. Session V presented peroxide modified PP for fiber applications, new industrial textile end-uses in South Africa, flame retardancy and mathematical modelling of a PP short spin process. Session VI described automotive applications and industrial products. Session VII dealt with specialties, recycling and international markets.

This handbook presents the state-of-the-art to chemists, engineers and end-users.

*H. Domininghaus (Dreieich)*

**Polypropylene '93 MBS Conference**, organized by Maack Business Services, Plastics Technology and Marketing on Oct. 26-27, 1993 in Zürich/Switzerland. 346 pages, 234 figures, 60 tables, 123 references. Publisher: Maack Business Services, Moosacherstr. 14, CH-8804 Au/Zürich (1993) Loose leaf binder, DIN A4 SFr 650,-

Since the early sixties the by means of stereospecific Ziegler/Natta-catalysts produced polypropylene has found a lively interest by chemists active in research and development of PP and this trend is still going strong. In comparison to high density polyethelene the characteristics of PP are very promising. They open its way to the so-called engineering plastics. This trend was documented by 25 lectures prepared by 32 authors and co-authors.

The first session dealt with metallocene catalysts, functional addition systems, high melt flow random copolymers, clarification technology and high performance cost effective additives. Session II discussed profitability optimization, a Middle East perspective and technical PP closing the material loop. Session III described industrial and automotive applications: effect of phosphite antioxidants on reinforced PP, UV-stabilization, development axes of PP for injection, adhesion problems in multi-coinjection moulding and GMT in automotive applications. Session IV dealt with films, sheet and thermoforming. Session V presented tapes, cast film, BOPP and PP modifier. Finally Session VI discussed stretch blow moulding, future markets and the problems about recycling and environment.

Chemists, engineers and practitioners will appreciate this comprehensive survey of new developments and the chances of PP in the future.

*H. Domininghaus (Dreieich)*

**Styrenics '93 MBS Conference** organized by Maack Business Services, Plastics Technology and Marketing on Dec. 6-7-8, 1993 in Zürich/Switzerland, 299 pages, 153 figures, 42 tables, 17 references. Publisher: Maack Business Services, Moosacherstr. 14, CH-8804 Au/Zürich SFr 650,-

It was the aim of the 36 authors and co-authors from all over the world to inform the participants of the conference by 32 lectures about recent developments in global business changes, interpolymer competition, resins, markets, application and end-uses of styrenics. The first of the six sessions dealt with new resins e.g. syndiotactic polystyrene, transparent SB-composites, new copolymers of styrene and maleic anhydride (SMA), compatible acrylics for modifying PS and with flame retardants. Session II discussed the cycles and cycles management in thermoplastics business, markets, growth, competition, development, costs and impacts on quality. Session III opened new perspectives for PS as packaging material, decorating of rigid food containers, the use of CO<sub>2</sub> as blowing agent for PS foam sheet, linear clear thermoplastic elastomers for high performance transparent packaging and coffee cups with recycled material. In Session IV durable applications were presented (HCFC resistant refrigerator sheet, recycling case study TV, writable CDs and entertainment applications). Session V discussed the waste management for PS in different applications. Session VI dealt with interpolymer competition, barrier resins and complementary substitution to thermoplastics recycling. The study of this conference handbook can be valuable help to all specialists engaged in this dynamic field of activity.

*H. Domininghaus (Dreieich)*

**An Introduction to the Mechanical Properties of Solid Polymers** by A.M. Ward and D.W. Hadley, 334 pages, 204 figures, 13 tables, 375 references. John Wiley & Sons, Chichester, New York, Brisbane, Toronto, Singapore (1993) Paper cover £ 19,95 ISBN 0-471-93874-2 (cloth) ISBN 0-471-93887-4 (paper)

Whilst the first two editions of the book were developed at an elementary level but with no concession to brevity the

presented textbook is somewhat less extensive regarding advanced topics such as finite elasticity and non-linear viscosity. But there is no loss of rigour. Certain new topics such as polymer composites have been included. The content is divided in twelve chapters and two appendices. Chapter 1 deals with chemical and physical structure (rotational isomerism, orientation and crystallinity) followed by chapter 2 about deformation of an elastic solid as well as discussions about rubber-like elasticity, principles of linear viscoelasticity, the measurement of viscoelastic behaviour, studies of linear viscoelastic behaviour as a function of frequency and temperature: time/temperature-equation in chapter 3 to 6. The following chapters (8 to 12) describe the anisotropic mechanical behaviour, macro- and microscale polymer composites, relaxation transitions, creep, stress relaxation and non-linear viscosity, the yield behaviour of polymers and the breaking phenomena.

In appendix 1 scalars, vectors and tensors, matrix notation, transformation of tensors from one set of coordinate axes to another and the Mohr circle construction are described. Rivlin, Moonley and Ogden strain-energy functions are given in appendix 2. Answers to problems mentioned in the different chapters are given in detail in the final appendix.

This book gives a distinct and understandable information about the scientific fundamentals on mechanical properties. It will be a great and appreciated help to engineers, technical physicists, application technicians and postgraduated students.

*H. Domininghaus (Dreieich)*

**Polymer Surfaces (From Physics to Technology)** by Fabio Gabassi, Macro Morra and Ernesto Occhiello, 462 pages, 211 figures, 32 tables, 2009 references. John Wiley & Sons, Chichester, New York, Brisbane Toronto, Singapore (1993) Hardcover £ 60,- ISBN 0-471-93817-3

Instead of giving a collection of contributions from different authors mostly spread over a large number of journals concerning different fields and thus only available with difficulty to the single scientist the authors conceived a content that starts from the physical principles and proceeds to the more important application aspects.

The book is divided in 13 chapters grouped in four parts. The first part deals with some fundamentals (Van der Waal's forces, electrostatic forces, the DLVO theory, structural interactions and dynamics of polymer surfaces. The following chapter discusses the methods that characterize polymer surfaces (spectroscopic methods), chapter 4 and 5 deal with surface energetics and contact angle as well as new emerging methods. The third part, i.e. chapter 6 and 8 discuss the physical, chemical and bulk modifications (blends and block copolymers). Finally the fourth part brings the application aspects such as wettability, adhesion, barrier properties, biomedical materials, friction and wear.

The book gives the state-of-the-art for all the above subjects. It will be a great help to research and development chemists and physico-chemists as well as to application engineers. Lecturers and students too will appreciate this clear and comprehensive survey.

*H. Domininghaus (Dreieich)*