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### *Editors*

Prof. Dr. Dr. h.c. Bernhard Rieger  
Technische Universität München  
WACKER-Lehrstuhl für  
Makromolekulare Chemie  
München  
Germany  
rieger@tum.de

Prof. Dr. Geoffrey W. Coates  
Department of Chemistry & Chemical  
Biology  
Cornell University  
Baker Laboratory  
Ithaca, New York  
USA  
gc39@cornell.edu

Prof. Dr. Eckhard Dinjus  
Karlsruher Institut für Technologie  
Institut für Katalyseforschung und  
Technologie  
Herrmann-von-Helmholtz-Platz 1  
76344 Eggenstein  
Germany  
eckhard.dinjus@kit.edu

Prof. Dr. Andreas Künkel  
BASF SE  
GMT/B - B001  
67056 Ludwigshafen a. Rhein  
Germany  
andreas.kuenkel@basf.com

Dr. Robert Reichardt  
BASF SE  
GMD/P - B001  
67056 Ludwigshafen a. Rhein  
Germany  
robert.reichardt@basf.com

Dr. Thomas A. Zevaco  
Karlsruher Institut für Technologie  
Institut für Katalyseforschung und  
Technologie  
Herrmann-von-Helmholtz-Platz 1  
76344 Eggenstein  
Germany  
thomas.zevaco@kit.edu

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## Volume Editors

Prof. Dr. Dr. h.c. Bernhard Rieger  
Technische Universität München  
WACKER-Lehrstuhl für  
Makromolekulare Chemie  
München  
Germany  
*rieger@tum.de*

Prof. Dr. Geoffrey W. Coates  
Department of Chemistry & Chemical  
Biology  
Cornell University  
Baker Laboratory  
Ithaca, New York  
USA  
*gc39@cornell.edu*

Prof. Dr. Eckhard Dinjus  
Karlsruher Institut für Technologie  
Institut für Katalyseforschung und  
Technologie  
Herrmann-von-Helmholtz-Platz 1  
76344 Eggenstein  
Germany  
*eckhard.dinjus@kit.edu*

Prof. Dr. Andreas Künkel  
BASF SE  
GMT/B - B001  
67056 Ludwigshafen a. Rhein  
Germany  
*andreas.kuenkel@basf.com*

Dr. Robert Reichardt  
BASF SE  
GMD/P - B001  
67056 Ludwigshafen a. Rhein  
Germany  
*robert.reichardt@basf.com*

Dr. Thomas A. Zevaco  
Karlsruher Institut für Technologie  
Institut für Katalyseforschung und  
Technologie  
Herrmann-von-Helmholtz-Platz 1  
76344 Eggenstein  
Germany  
*thomas.zevaco@kit.edu*

## Editorial Board

Prof. Akihiro Abe  
Professor Emeritus  
Tokyo Institute of Technology  
6-27-12 Hiyoshi-Honcho, Kohoku-ku  
Yokohama 223-0062, Japan  
*aabe34@xc4.so-net.ne.jp*

Prof. A.-C. Albertsson  
Department of Polymer Technology  
The Royal Institute of Technology  
10044 Stockholm, Sweden  
*aila@polymer.kth.se*

Prof. Karel Dušek  
Institute of Macromolecular Chemistry  
Czech Academy of Sciences  
of the Czech Republic  
Heyrovský Sq. 2  
16206 Prague 6, Czech Republic  
*dusek@imc.cas.cz*

Prof. Jan Genzer  
Department of Chemical &  
Biomolecular Engineering  
North Carolina State University  
911 Partners Way  
27695-7905 Raleigh, North Carolina, USA

Prof. Wim H. de Jeu  
DWI an der RWTH Aachen eV  
Pauwelsstraße 8  
D-52056 Aachen, Germany  
*dejeu@dw.rwth-aachen.de*

Prof. Shiro Kobayashi  
R & D Center for Bio-based Materials  
Kyoto Institute of Technology  
Matsugasaki, Sakyo-ku  
Kyoto 606-8585, Japan  
*kobayash@kit.ac.jp*

Prof. Kwang-Sup Lee

Department of Advanced Materials  
Hannam University  
561-6 Jeonmin-Dong  
Yuseong-Gu 305-811  
Daejeon, South Korea  
*kslee@hnu.kr*

Prof. L. Leibler

Matière Molle et Chimie  
Ecole Supérieure de Physique  
et Chimie Industrielles (ESPCI)  
10 rue Vauquelin  
75231 Paris Cedex 05, France  
*ludwik.leibler@espci.fr*

Prof. Timothy E. Long

Department of Chemistry  
and Research Institute  
Virginia Tech  
2110 Hahn Hall (0344)  
Blacksburg, VA 24061, USA  
*telong@vt.edu*

Prof. Ian Manners

School of Chemistry  
University of Bristol  
Cantock's Close  
BS8 1TS Bristol, UK  
*ian.manners@bristol.ac.uk*

Prof. Martin Möller

Deutsches Wollforschungsinstitut  
an der RWTH Aachen e.V.  
Pauwelsstraße 8  
52056 Aachen, Germany  
*moeller@dwf.rwth-aachen.de*

Prof. E.M. Terentjev

Cavendish Laboratory  
Madingley Road  
Cambridge CB 3 0HE, UK  
*emt1000@cam.ac.uk*

Prof. Maria Jesus Vicent

Centro de Investigacion Principe Felipe  
Medicinal Chemistry Unit  
Polymer Therapeutics Laboratory  
Av. Autopista del Saler, 16  
46012 Valencia, Spain  
*mjvicent@cipf.es*

Prof. Brigitte Voit

Leibniz-Institut für Polymerforschung  
Dresden  
Hohe Straße 6  
01069 Dresden, Germany  
*voit@ipfdd.de*

Prof. Gerhard Wegner

Max-Planck-Institut  
für Polymerforschung  
Ackermannweg 10  
55128 Mainz, Germany  
*wegner@mpip-mainz.mpg.de*

Prof. Ulrich Wiesner

Materials Science & Engineering  
Cornell University  
329 Bard Hall  
Ithaca, NY 14853, USA  
*ubw1@cornell.edu*

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## Aims and Scope

The series presents critical reviews of the present and future trends in polymer and biopolymer science including chemistry, physical chemistry, physics and material science. It is addressed to all scientists at universities and in industry who wish to keep abreast of advances in the topics covered.

Review articles for the topical volumes are invited by the volume editors. As a rule, single contributions are also specially commissioned. The editors and publishers will, however, always be pleased to receive suggestions and supplementary information. Papers are accepted for *Advances in Polymer Science* in English.

In references *Advances in Polymer Sciences* is abbreviated as *Adv Polym Sci* and is cited as a journal.

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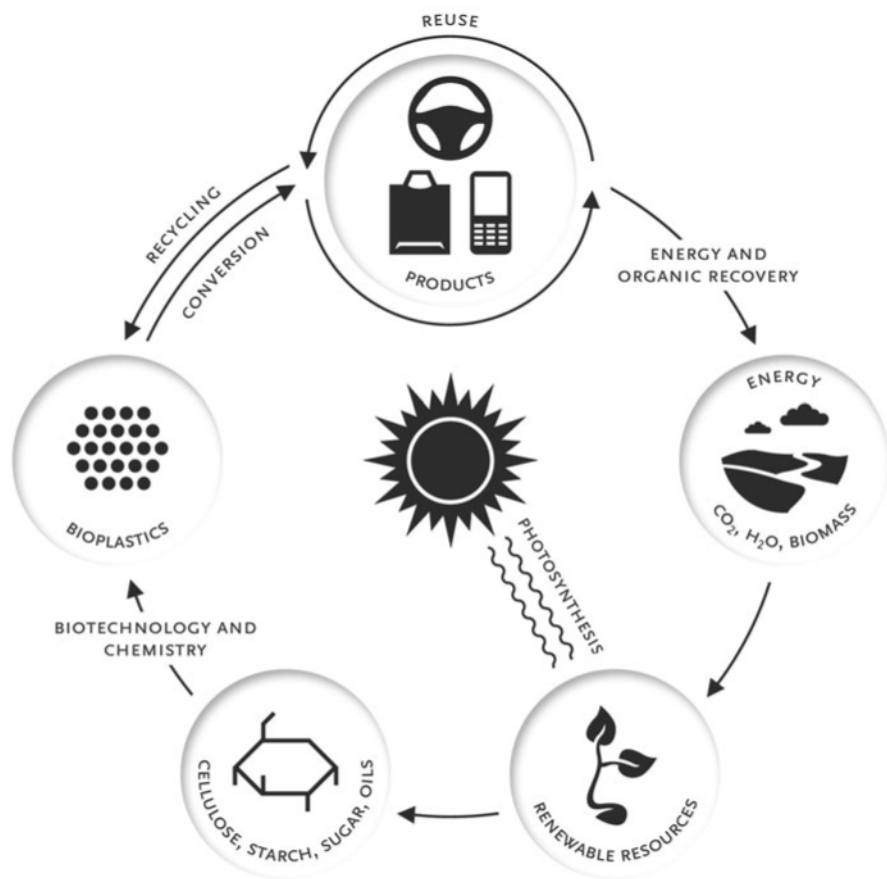
# Preface

The majority of the polymers in use today have been developed within the last 60 years. A large proportion of these are synthetic products, which basically means that they are prepared from simple technical monomers. Their principal advantages are light weight, high impact and tensile strengths, resistance to corrosion, salt water and most chemicals, as well as suitability for use over a wide range of temperatures. The various possibilities to fine-tune their properties for plentiful applications have resulted in continuously growing polymer production of the last years.

Besides some smaller applications as materials for electronics or automotives, polymers are mainly used in construction (21%) and as packaging materials (38%). The latter is a comparably short-term application which causes a disposal problem due to the longevity and undefined environmental fate of the materials. For this reason, waste management of polymers is of high interest. Waste disposal sites only shift the problem and cause new environmental concerns [1]. Accordingly, administrations generate new regulations in order to avoid such environmental pollution. For example, the European Union has restricted the amount of polymeric materials designated to landfill. Each member state has to reduce 65% of this volume of waste by July 2016 and find alternative recovery methods [2]. Recycling of polymeric products, however, is extremely cost-intensive [3] and is hindered by the use of non-mono-material products [4]. Utilization of the high intrinsic fuel value by waste combustion does not solve the problem due to pollutant emissions and residues that need to be disposed of as hazardous waste [5]. Therefore, one elegant way to deal with this problem is the use of biodegradable representatives especially in short-term applications such as packaging, foils, and utilities in agriculture.

Biodegradable polymers are macromolecules mainly derived from renewable sources, which can be enzymatically or hydrolytically degraded into low molecular parts. These parts can be reabsorbed by microorganisms, which ideally convert them to CO<sub>2</sub> and water heading to an environmentally closed circular flow economy between growing of nutrients, production, utilization, and material recycling (Fig. 1).

## Life Cycle Model



**Fig. 1** Life cycle model of biorenewable polymers according to European Bioplastics [6]

In the recent years, new markets have arisen for biodegradable polymers such as poly(butylene adipate-terephthalate), poly(lactide), poly(butylenesuccinate), or poly(3-hydroxybutyrate) and poly(carbonates). They constitute a new class of “green polymers” with wide application potential for packaging, clothing, carpets, applications in automotive engineering, foils, and utilities in agriculture.

Herein we present the latest results and developments in this field. In our opinion, current trends are promoted by both academic research and industrial developments. Therefore, we decided to present a combination of both perspectives within this volume.

