

Renewable and Sustainable Polymers



Library of Congress Cataloging-in-Publication Data

Library of Congress Cataloging-in-Publication Data

Renewable and sustainable polymers / Gregory F. Payne, editor; Patrick B. Smith, editor.
p. cm. -- (ACS symposium series ; 1063)

"Sponsored by the ACS Division of Polymer Chemistry."

Includes bibliographical references and index.

ISBN 978-0-8412-2608-1 (hardcover OP) | ISBN 978-1-7138-9511-4 (pod)

1. Polymers--Congresses. I. Payne, G. (Gregory F.) II. Smith, Patrick B., Dr. III. American Chemical Society. Division of Polymer Chemistry.

QD381.8.R46 2011

547'.7--dc22

2011010200

The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39.48n1984.

Copyright © 2011 American Chemical Society

Distributed in print by Oxford University Press, Inc.

All Rights Reserved. Reprographic copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Act is allowed for internal use only, provided that a per-chapter fee of \$40.25 plus \$0.75 per page is paid to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA. Reproduction or reproduction for sale of pages in this book is permitted only under license from ACS. Direct these and other permission requests to ACS Copyright Office, Publications Division, 1155 16th Street, N.W., Washington, DC 20036.

The citation of trade names and/or names of manufacturers in this publication is not to be construed as an endorsement or as approval by ACS of the commercial products or services referenced herein; nor should the mere reference herein to any drawing, specification, chemical process, or other data be regarded as a license or as a conveyance of any right or permission to the holder, reader, or any other person or corporation, to manufacture, reproduce, use, or sell any patented invention or copyrighted work that may in any way be related thereto. Registered names, trademarks, etc., used in this publication, even without specific indication thereof, are not to be considered unprotected by law.

PRINTED IN THE UNITED STATES OF AMERICA

Contents

1. The Emergence of Renewable and Sustainable Polymers	1
Patrick B. Smith and Gregory F. Payne	
2. Copolyester Synthesis Using Glycerol from Biodiesel Production	11
Massoud J. Miri, Keelyn E. Nori, Rebecca M. Andrew, and Changfeng Ge	
3. Bioplastics, Biocomposites, and Biocoatings from Natural Oils	37
Rafael L. Quirino and Richard C. Larock	
4. Biofabrication: Enlisting the Unique Capabilities of Biological Polymers for Hierarchical Construction	61
Benjamin D. Liba, India V. Aranha, Eunkyong Kim, and Gregory F. Payne	
5. Polyurethanes from Hybrid Vegetable Oil/Petrochemical Polyester Polyols	73
Mihail Ionescu, Ye Ji, William M. Shirley, and Zoran S. Petrović	
6. Revitalizing Chemurgy: Chemicals from Agricultural Resources	95
Patrick B. Smith	
7. Cellulosic-Derived Levulinic Ketal Esters: A New Building Block	111
Cora Leibig, Brian Mullen, Tara Mullen, Lee Rieth, and Vivek Badarinarayana	
8. Biopolymers, Processing, and Biodegradation	117
Bo Shi, Vasily Topolkaev, and James Wang	
9. Flame Retardants Based on Tartaric Acid: A Renewable By-Product of the Wine Industry	133
B. A. Howell, K. E. Carter, and H. Dangalle	
10. Controlled Ring-Opening Polymerization of <i>L</i>-Lactide Triggered by Supramolecular Organocatalytic Systems	153
Joji Kadota, Sylvain Koeller, Dražen Pavlović, Jean-Pierre Desvergne, Brigitte Bibal, Frédéric Peruch, and Alain Deffieux	
11. Zinc Complexes with Mono- and Polydentate Behaving Guanidine Ligands and Their Application in Lactide Polymerization	169
Janna Börner, Ines dos Santos Vieira, Ulrich Flörke, Artjom Döring, Dirk Kuckling, and Sonja Herres-Pawlis	

Indexes

Author Index	203
Subject Index	205