

# Polymerisation and Depolymerisation Chemistry: The Second Century

Trinity College, Oxford, United Kingdom

8-10 September 2025



## FARADAY DISCUSSIONS

Volume 262, 2026



The Faraday Community for Physical Chemistry of the Royal Society of Chemistry, previously the Faraday Society, was founded in 1903 to promote the study of sciences lying between chemistry, physics and biology.

## Editorial Staff

### Executive Editor

Michael A. Rowan

### Deputy Editor

Vikki Pritchard

### Development Editors

Bee Hockin, Andrea Carolina Ojeda-Porras

### Editorial Manager

Gisela Scott

### Associate Editorial Manager

Chris Goodall

### Publishing Coordinator

Konoya Das

### Publishing Editors

Kirsty McRoberts and Rini Prakash

### Editorial Assistant

Daphne Houston

### Publishing Assistants

Lee Colwill and Julie-Ann Roszkowski

### Publisher

Sam Keltie

Faraday Discussions (Print ISSN 1359-6640, Electronic ISSN 1364-5498) is published 8 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WF.

Volume 262 ISBN 978-1-83707-068-8

2026 annual subscription price: print+electronic £1355

US \$2385; electronic only £1291, US \$2272.

Customers in Canada will be subject to a surcharge to cover GST. Customers in the EU subscribing to the electronic version only will be charged VAT.

All orders, with cheques made payable to the Royal Society of Chemistry, should be sent to the Royal Society of Chemistry Order Department, Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WF, UK Tel +44 (0)1223 432398; E-mail [orders@rsc.org](mailto:orders@rsc.org)

If you take an institutional subscription to any Royal Society of Chemistry journal you are entitled to free, site-wide web access to that journal. You can arrange access via Internet Protocol (IP) address at [www.rsc.org/ip](http://www.rsc.org/ip)

Customers should make payments by cheque in sterling payable on a UK clearing bank or in US dollars payable on a US clearing bank.

Whilst this material has been produced with all due care, the Royal Society of Chemistry cannot be held responsible or liable for its accuracy and completeness, nor for any consequences arising from any errors or the use of the information contained in this publication. The publication of advertisements does not constitute any endorsement by the Royal Society of Chemistry or Authors of any products advertised. The views and opinions advanced by contributors do not necessarily reflect those of the Royal Society of Chemistry which shall not be liable for any resulting loss or damage arising as a result of reliance upon this material. The Royal Society of Chemistry is a charity, registered in England and Wales, Number 207890, and a company incorporated in England by Royal Charter (Registered No. RC000524), registered office: Burlington House, Piccadilly, London W1J 0BA, UK, Telephone: +44 (0) 207 4378 6556.

Printed in the UK

# Faraday Discussions

*Faraday Discussions* are unique international discussion meetings that focus on rapidly developing areas of chemistry and its interfaces with other scientific disciplines.

## Scientific Committee volume 262

### Chairs

Charlotte Williams, University of

Oxford, UK

Antoine Buchard, University of

York, UK

### Committee

Matthew Becker, Duke University,

United States

Andrew Dove, University of

Birmingham, UK

Theoni Georgiou, Imperial College

London, UK

Steve Howdle, University of

Nottingham, UK

## Faraday Standing Committee on Conferences

### Chair

Caroline Dessert, University of

York, UK

### Secretary

Susan Weatherby, Royal Society of

Chemistry, UK

Emma Gibson, University of Glasgow,

UK

Julia Lehman, University of

Birmingham, UK

Andrew Mount, University of

Edinburgh, UK

Julia Weinstein, University of

Sheffield, UK

Martijn Zwijnenburg, University

College London, UK

## Advisory Board

Vic Arcus, The University of Waikato, New Zealand

Michel Orrit, Leiden University, The Netherlands

Timothy Easun, Cardiff University, UK

Zhong-Qun Tian, Xiamen University, China

Dirk Guldi, University of Erlangen-

Nuremberg, Germany

Marina Kuimova, Imperial College

London, UK

Luis Liz-Marzán, CIC biomaGUNE, Spain

Julia Weinstein, University of

Andrew Mount, University of

Sheffield, UK

Edinburgh, UK

Sihai Yang, University of Manchester,

Frank Neese, Max Planck Institute for Chemical Energy Conversion, Germany

UK

## Information for Authors

This journal is © the Royal Society of Chemistry 2026. Apart from fair dealing for the purposes of research or private study for non-commercial purposes, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988 and the Copyright and Related Rights Regulation 2003, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the Publishers or in the case of reprographic reproduction in accordance with the terms of licences issued by the Copyright Licensing Agency in the UK. US copyright law is applicable to users in the USA.

© The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

Registered charity number: 207890



# Polymerisation and Depolymerisation Chemistry: The Second Century

Faraday Discussions

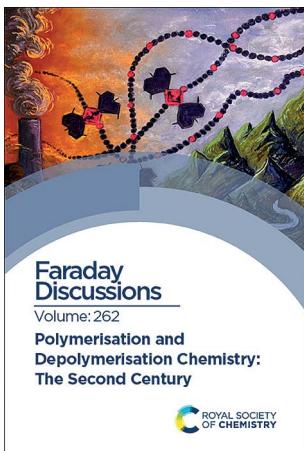
[www.rsc.org/faraday\\_d](http://www.rsc.org/faraday_d)

A General Discussion on Polymerisation and Depolymerisation Chemistry: The Second Century was held in Oxford, UK on the 8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup> of September 2025.

*The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.*

## CONTENTS

ISSN 1359-6640; ISBN 978-1-83707-068-8



### Cover

See Arnaud Thevenon, Pieter C. A. Bruijnincx *et al.*, *Faraday Discuss.*, 2026, 262, 349–366.

Introducing reactive handles on hydrocarbon-based polymers via manganese catalysed oxidation to create new polymer platforms with expanded applications and improved end-of-life management.

Image reproduced by permission of Żaneta Wawzyńczak, Maartje Otten, Pieter Bruijnincx and Arnaud Thevenon from Arnaud Thevenon, Pieter C. A. Bruijnincx *et al.*, *Faraday Discuss.*, 2026, 262, 349–366.

## PREFACE

### 10 Preface: Polymerisation and depolymerisation chemistry: the second century *Faraday Discussion*

Antoine Buchard and Charlotte K. Williams

## INTRODUCTORY LECTURE

### 12 Spiers Memorial Lecture: Compostable plastics: promise and pitfalls Eric D. Rachita, Jinsol Yook, Annabelle Watts, Christopher J. Ellison and Marc A. Hillmyer





# Green Chemistry



# RSC Applied Polymers



# RSC Sustainability

46 **Efficient room-temperature synthesis of crosslinked polyhydroxyurethanes from 5-membered cyclic carbonates without solvent or catalyst**  
P. Helbling, C. Desgoulières, F. Hermant, M. Petit, T. Vidil and H. Cramail

68 **Blending PHBV with P(3HB-co-4HB) for superior thermal stability, mechanical strength, and environmental degradation**  
Ana Carolina Lemos de Moraes, Allef Gabriel da Silva Fortes, Iago Rodrigues de Abreu, Corinne van Noordenne-Bos, Vincent S. D. Voet, Rudy Folkersma and Katja Loos

94 **Synthesis and ring-opening (co)polymerization of lactones derived from the cotelomerization of isoprene, butadiene, and CO<sub>2</sub>**  
Ryan J. Anderson, Takuya Akiyama and Ian A. Tonks

104 **Ocean biomass-derived feedstocks for non-isocyanate polyurethane synthesis**  
Jane E. Peddle, Courtney M. Laprise, Mikhailey D. Wheeler, Megan M. Fitzgerald, Francesca M. Kerton and Christopher M. Kozak

123 **Polyglycerol resin towards sustainable 3D-printing**  
Katherine George, Eduards Krumins, Eileen Tan, Yinfeng He, Ricky Wildman, Robert Owen, Joel Segal, Valentina Cuzzucoli Crucitti and Vincenzo Taresco

138 **Chemical recycling of polylactide by microwave-assisted processes**  
Federica Santulli, Mauro Pio Ferrandino, Costantino Cioffi, Maria Rosaria Acocella, Marina Lamberti and Mina Mazzeo

152 **An old tool to obtain new polymers from renewable resources: [OSO]-type titanium-catalysed ethylene and myrcene copolymers**  
Fatemeh Niknam, Antonio Buonerba, David Hermann Lamparelli and Carmine Capacchione

169 **Novel feedstocks: general discussion**

191 **Efficient and controlled ring-opening copolymerization of cyclohexene oxide with cyclic anhydrides catalyzed by proline-based chiral alkyl Al(III) compounds**  
Ranay Kumar Ray, P. K. Sudhadevi Antharjanam and Debasish Chakraborty

212 **Dual-selective polymerization: achieving chemoselectivity and stereoselectivity in a single catalytic system**  
Hengxu Liu, Jiayun Jiang, Xue Liang, Wenli Wang, Hongru Qiang, Yuanzu Zhang and Yunqing Zhu

226 **Telechelic all-*cis* polycyclooctene via catalytic stereoretentive ROMP for the synthesis of polylactide-based ABA triblock copolymers**  
Jake L. Nicholson, Antoine C. Gravet and Quentin Michaudel

238 **Synthesis and characterization of stable nickel(II) complexes bearing long alkyl chains**  
Yuya Miyake, Koichiro Masada and Kyoko Nozaki

248 **Unleashing the power of non-toxic Zn-guanidine catalysts for sustainable lactide polymerization through smart modeling**  
Jinbo Ke, Niclas Conen, Filip Latz, Jan Niclas Neumann, Martin Fuchs, Alexander Hoffmann, Andreas Jupke and Sonja Herres-Pawlis





**275 Selective transesterification mediated by lanthanum complexes in the copolymerisation of lactide and  $\delta$ -valerolactone**  
Richard J. Pearcy, Stuart R. Berrow and Rachel H. Platel

**295 Catalysis: general discussion**

**311 More than ring-strain: revisiting the definition of enthalpy in ring-opening polymerization**  
Vincent Nieboer, Jakob Wohlert, Peter Olsén and Karin Odelius

**327 Improved 2PP additive manufacturing build/process quality via the use of hyperbranched pre-polymer**  
Andrea A. Konta, Michelle Duong, Joseph Sefton, Valentina Cuzzucoli Crucitti, Amy Stimpson, Sophie Goodwin, Thomas Swift, Gustavo F. Trindade, Yinfeng He, Mohamed Adam, Eleanor Binner, Laura Ruiz Cantu, Cameron Alexander, Ricky D. Wildman and Derek J. Irvine

**349 Post-polymerisation oxyfunctionalisation of styrene and butadiene-based (co-) polymers using a homogeneous manganese catalyst**  
Maartje Otten, Jeroen Hendriks, Nino Kalános, Arnaud Thevenon and Pieter C. A. Bruijnincx

**367 Is solvent-based dissolution and precipitation an effective substrate pretreatment for the enzymatic depolymerisation of poly(ethylene terephthalate)?**  
Brooke Wain, Gustavo P. Borin, Elaine M. Rudge, Benjamin Moore, Bruce R. Lichtenstein, Andrew R. Pickford and Victoria L. Bemmer

**385 On-demand manufacture of circular 3D-printable resins**  
Nailah N. Moghal, Daniele Giannantonio, Megan R. Elliott, Neha Mehta, Andrew P. Dove and Arianna Brandoles

**398 Borane-catalysed cyclodepolymerization of CO<sub>2</sub>-derived polycarbonates**  
Mikhailey D. Wheeler and Francesca M. Kerton

**414 Determining the biodegradation of functionalised cellulose esters**  
Katrina Entwistle, Sandhya Moise, Fatma Guler, Katherine A. Smart, Matthew Crow and Christopher J. Chuck

**432 Closing the loop – the chemistry of depolymerisation, polymer recycling and environmental degradation: general discussion**

**455 Thermodynamics of Ring-Opening Polymerisation Informatics Collection (TROPIC): a database to enable polymer chemical recycling**  
R. M. R. Reese, A. M. Ganose and C. Romain

**478 Harnessing data and control with AI/ML-driven polymerization and copolymerization**  
Rigoberto Advincula, Ilia Ivanov, Rama Vasudevan, Rajeev Kumar, Panagiotis Christakopoulos, Marieta Tsakanika, Jihua Chen, Jan Michael Carillo, Qinyu Zhu and Bobby Sumpter

**500 Understanding depolymerization kinetics of poly(butyl methacrylate) using flow chemistry**  
Leonard P. M. Göhringer, Gayathri Dev Ammini and Tanja Junkers

515 **Thermally and base-triggered 'debond-on-demand' crosslinked polyurethane adhesives**  
Alarqam Zyaad Tareq, Matthew Hyder, Josephine L. Harries and Wayne Hayes

527 **Self-assembled poly(L-lactide)-based platelets prepared via seeded growth**  
Laihui Xiao, Tianlai Xia and Rachel K. O'Reilly

541 **Polymerisation processes and computational methods to control structure: general discussion**

## CONCLUDING REMARKS

553 **Concluding remarks: Polymerisation and depolymerisation chemistry: the second century**  
Stefan Mecking

## ADDITIONAL INFORMATION

556 **Poster titles**  
561 **List of participants**

