POLYMER CIRCULARITY IN SUSTAINABLE ENERGY

EDITED BY
SABU THOMAS
BRUNO AMEDURI
JINCE THOMAS
MARTIN GEORGE THOMAS

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Edited by

Sabu Thomas
Mahatma Gandhi University, Kottayam, Kerala, India
Department of Physics and Electronics, Christ University, Bangalore, Karnataka, India
Center of Excellence in Polymeric Materials for Medical Practice Devices, Department of Chemical Engineering, Faculty of Engineering, Chulalongkorn University, Bangkok, Thailand
Polymer and Process Engineering, IIT Roorkee, Uttarakhand, India

Bruno Ameduri
Institute Charles Gerhardt, University Montpellier, CNRS, ENSCM, Montpellier, France

Jince Thomas
Department of Mechanical and Industrial Engineering, University of Toronto, ON, Canada

Martin George Thomas
Department of Physics and Electronics, Christ (Deemed to be University), Bengaluru, Karnataka, India

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Contributors

Ricardo Abejón
Universidad de Santiago de Chile USACH, Departamento de Ingeniería Química y Bioprocesos, Santiago de Chile, Chile

Waheed Afzal
School of Engineering, University of Aberdeen, Aberdeen, Scotland

Roberto J. Aguado
LEPAMAP-PRODIS Research Group, University of Girona, Girona, Spain

Muhammad Naseem Akhtar
Interdisciplinary Research Center for Refining and Advanced Chemicals, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia; Department of Chemistry, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia

Betül Aksoy
Ege University, Solar Energy Institute, Izmir, Turkey

Norah Al Fayez
Interdisciplinary Research Center for Refining and Advanced Chemicals, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia

Bruno M. Ameduri
ICGM, University Montpellier, CNRS, ENSCM, Montpellier, France

Yingjun An
Research Center for Negative Emission Technologies, Kyushu University, Nishi-ku Fukuoka, Japan

Muhammad Usman Azam
School of Engineering, Cardiff University, Cardiff, United Kingdom; School of Engineering, University of Aberdeen, Aberdeen, Scotland

Susanta Banerjee
Indian Institute of Technology Kharagpur, Materials Science Centre, Kharagpur, West Bengal, India

María Blecua
CIRCE — Technology Center, Edificio Dinamiza, Zaragoza, Spain

Suryasarathi Bose
Indian Institute of Science, Department of Materials Engineering, Bangalore, Karnataka, India

R. Brito-Pereira
BCMaterials, Basque Center for Materials, Applications and Nanostructures, UPV/EHU Science Park, Leioa, Spain

Melih Soner Celiktas
Ege University, Solar Energy Institute, Izmir, Turkey

Cecilia Chaine
CIRCE — Technology Center, Edificio Dinamiza, Zaragoza, Spain

C.M. Costa
Centre of Physics Universities of Minho and Porto and Laboratory of Physics for Materials and Emergent Technologies, LapMET, University of Minho, Campus de Gualtar, Braga, Portugal; Institute of Science and Innovation for Bio-Sustainability (IB-S), University of Minho, Braga, Portugal

P. Costa
Centre of Physics Universities of Minho and Porto and Laboratory of Physics for Materials and Emergent Technologies, LapMET, University of Minho, Campus de Gualtar, Braga, Portugal

Marc Delgado-Aguilar
LEPAMAP-PRODIS Research Group, University of Girona, Girona, Spain

Rohitha Devaraj
Industrial and Environmental Sustainability Laboratory, Department of Biotechnology, School of Bioengineering, SRM Institute of Science and Technology, Chennai, Tamil Nadu, India

Indranil Dey
Indian Institute of Science, Department of Materials Engineering, Bangalore, Karnataka, India

Eliana Díaz-Cruces
Grupo de Investigación Derecho Equidad Gobernanza y Sostenibilidad para la Justicia Social (LEGOS), Facultad de Ciencias Jurídicas, Universidad a Distancia de Madrid (UDIMA), Madrid, Spain

Etienne Fleury
INSA Lyon, Université Lyon 1, Université Jean Monnet Saint-Etienne, CNRS, IMP, UMR5223, Villeurbanne, France

Emma Franco-Mateos
CIRCE — Technology Center, Edificio Dinamiza, Zaragoza, Spain

Kazuki Fujiwara
Graduate School of Environmental Studies, Tohoku University, Sendai, Japan

Sekaran Ganesan
Industrial and Environmental Sustainability Laboratory, Department of Biotechnology, School of Bioengineering, SRM Institute of Science and Technology, Chennai, Tamil Nadu, India

Martin George Thomas
ICGM, University Montpellier, CNRS, ENSCM, Montpellier, France; Department of Physics & Electronics, CHRIST University (Deemed to be University), Bangalore, Karnataka, India

Bholanath Ghanti
Indian Institute of Technology Kharagpur, Materials Science Centre, Kharagpur, West Bengal, India

Agustín González
Universidad Nacional de Córdoba, Facultad de Ciencias Químicas, Departamento de Química Orgánica, Córdoba, Argentina; Instituto de Investigación y Desarrollo en Ingeniería de Procesos y Química Aplicada (IPQA-CONICET), Córdoba, Argentina

Inês Graça
School of Engineering, University of Aberdeen, Aberdeen, Scotland

Sanna Gull
Interdisciplinary Research Center for Sustainable Energy Systems, King Fahd University of Petroleum and Minerals (KFUPM), Saudi Arabia

Mohammad Harun-Ur-Rashid
International University of Business Agriculture and Technology (IUBAT), Department of Chemistry, Dhaka, Bangladesh

Abu Bin Imran
Bangladesh University of Engineering and Technology, Department of Chemistry, Dhaka, Bangladesh

Haru Ishikawa
Graduate School of Environmental Studies, Tohoku University, Sendai, Japan

Hasan Jameel
Department of Forest Biomaterials, North Carolina State University, Raleigh, NC, United States

Tomoko Kajiwara
Research Center for Negative Emission Technologies, Kyushu University, Nishi-ku Fukuoka, Japan

Ramani Kandasamy
Industrial and Environmental Sustainability Laboratory, Department of Biotechnology, School of Bioengineering, SRM Institute of Science and Technology, Chennai, Tamil Nadu, India

Serena Kocyan
INSA Lyon, F-69621, Villeurbanne Cedex, France

Shogo Kumagai
Graduate School of Environmental Studies, Tohoku University, Sendai, Japan; Graduate School of Engineering, Tohoku University, Sendai, Japan

Jacques Lalevée
Université de Haute-Alsace, CNRS, Mulhouse, France; Université de Strasbourg, Strasbourg, France

S. Lanceros-Méndez
Centre of Physics Universities of Minho and Porto and Laboratory of Physics for Materials and Emergent Technologies, LapMET, University of Minho, Campus de Gualtar, Braga, Portugal; BCMaterials, Basque Center for Materials, Applications and Nanostructures, UPV/EHU Science Park, Leioa, Spain; IKERBASQUE, Basque Foundation for Science, Bilbao, Spain

Pralay Maiti
School of Materials Science and Technology, Indian Institute of Technology (BHU), Varanasi, Uttar Pradesh, India

Ronald Marquez
LEPAMAP-PRODIS Research Group, University of Girona, Girona, Spain

Pablo A. Mercadal
Universidad Nacional de Córdoba, Facultad de Ciencias Químicas, Departamento de Química Orgánica, Córdoba, Argentina; Instituto de Investigación y Desarrollo en Ingeniería de Procesos y Química Aplicada (IPQA-CONICET), Córdoba, Argentina; Universidad Nacional de Córdoba, Facultad de Ciencias Agropecuarias, Departamento de Recursos Naturales, Córdoba, Argentina

Anastasia-Maria Moschovi
Monolithos Catalysts & Recycling Ltd, Athens, Greece

Gustavo Muñoz
Mississippi State University, Starkville, MS, United States

Guy Olivier Ngongang Ndjawa
Interdisciplinary Research Center for Sustainable Energy Systems, King Fahd University of Petroleum and Minerals (KFUPM), Saudi Arabia; Chemical Engineering Department, King Fahd University of Petroleum and Minerals (KFUPM), Dhahran, Saudi Arabia

Toru Nishiyama
Environmental Solution Department, DOWA Eco-System Co. Ltd., Tokyo, Japan

Pranav Omanakuttan
School of Energy Materials, School of Chemical Sciences, School of Nanoscience and Nanotechnology, International and Inter University Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam, Kerala, India

Yasemin Ozliman
Ege University, Solar Energy Institute, Izmir, Turkey; Izmir Bakircay University, Izmir, Turkey

Adchara Padermshoke
Research Center for Negative Emission Technologies, Kyushu University, Nishi-ku Fukuoka, Japan

Lokendra Pal
Department of Forest Biomaterials, North Carolina State University, Raleigh, NC, United States

Ashwanth Pari
Industrial and Environmental Sustainability Laboratory, Department of Biotechnology, School of Bioengineering, SRM Institute of Science and Technology, Chennai, Tamil Nadu, India

Upakar Patel
School of Materials Science and Technology, Indian Institute of Technology (BHU), Varanasi, Uttar Pradesh, India

Ekaterini Polyzou
Monolithos Catalysts & Recycling Ltd, Athens, Greece

Daniel Portinha
INSA Lyon, Université Lyon 1, Université Jean Monnet Saint-Etienne, CNRS, IMP, UMR5223, Villeurbanne, France

Yuko Saito
Graduate School of Environmental Studies, Tohoku University, Sendai, Japan

Mariangeles Salas
Department of Forest Biomaterials, North Carolina State University, Raleigh, NC, United States

Ketaki Samanta
Indian Institute of Science, Department of Materials Engineering, Bangalore, Karnataka, India

Dennis W. Smith, Jr.
Mississippi State University, Starkville, MS, United States

Maxim Solovyev
Mississippi State University, Starkville, MS, United States

Sathyaprakash Sreenivasan
Industrial and Environmental Sustainability Laboratory, Department of Biotechnology, School of Bioengineering, SRM Institute of Science and Technology, Chennai, Tamil Nadu, India

Masimukku Srinivaas
Center for Environmental Toxin and Emerging-Contaminant Research, Cheng Shiu University, Kaohsiung, Taiwan

Md. Abu Bin Hasan Susan
University of Dhaka, Faculty of Science and Dhaka University Nanotechnology Center, Dhaka, Bangladesh

Atsushi Takahara
Research Center for Negative Emission Technologies, Kyushu University, Nishi-ku Fukuoka, Japan

Quim Tarres
LEPAMAP-PRODIS Research Group, University of Girona, Girona, Spain

Sabu Thomas
Department of Physics & Electronics, CHRIST University (Deemed to be University), Bangalore, Karnataka, India; Polymer and Process Engineering, IIT Roorkee, Uttarakhand, India

Muhammad Umer
Centre for Sustainable Technologies, School of Architecture and the Built Environment, Ulster University, Belfast, United Kingdom

Karmuhil Mathimozhiyazh Vetriselvan
Industrial and Environmental Sustainability Laboratory, Department of Biotechnology, School of Bioengineering, SRM Institute of Science and Technology, Chennai, Tamil Nadu, India

Iakovos Yakoumis
Monolithos Catalysts & Recycling Ltd, Athens, Greece

Kaidan Yang
Université de Haute-Alsace, CNRS, Mulhouse, France; Université de Strasbourg, Strasbourg, France

Toshiaki Yoshioka
Graduate School of Environmental Studies, Tohoku University, Sendai, Japan

Eirini Zagoraiou
Monolithos Catalysts & Recycling Ltd, Athens, Greece

Camilo Zamora-Ledezma
Bioengineering & Regenerative Medicine Research Group (Bio-ReM), Escuela de Ingeniería, Arquitectura y Diseño (EIAD), Universidad Alfonso X el Sabio (UAX), Madrid, Spain; Biomedical Research Unit (UIB-UAX), Universidad Alfonso X el Sabio (UAX), Madrid, Spain; Green and Innovative Technologies for Food, Environment and Bioengineering Research Group (FEnBeT), Faculty of Pharmacy and Nutrition, UCAM-Universidad Católica San Antonio de Murcia, Murcia, Spain

CHAPTER

2 Regulatory frameworks and policies for polymer recycling

Eliana Díaz-Cruces[1] and Camilo Zamora-Ledezma[2,3,4]

[1]*Grupo de Investigación Derecho Equidad Gobernanza y Sostenibilidad para la Justicia Social (LEGOS), Facultad de Ciencias Jurídicas, Universidad a Distancia de Madrid (UDIMA), Madrid, Spain;* [2]*Bioengineering & Regenerative Medicine Research Group (Bio-ReM), Escuela de Ingeniería, Arquitectura y Diseño (EIAD), Universidad Alfonso X el Sabio (UAX), Madrid, Spain;* [3]*Biomedical Research Unit (UIB-UAX), Universidad Alfonso X el Sabio (UAX), Madrid, Spain;* [4]*Green and Innovative Technologies for Food, Environment and Bioengineering Research Group (FEnBeT), Faculty of Pharmacy and Nutrition, UCAM-Universidad Católica San Antonio de Murcia, Murcia, Spain*

1. Introduction

Plastic pollution has become one of the most persistent environmental challenges worldwide, with millions of tons of plastic waste entering natural ecosystems each year (Williams and Rangel-Buitrago, 2022). This issue not only intimidates marine and terrestrial life but also poses serious risks to human health and the stability of global food sequences (Rhodes, 2018). As a matter of fact, the extensive use of single-use plastics, combined with insufficient recycling infrastructure and waste management systems, has led to the accumulation of plastic fragments even in the most remote corners of the planet (Bergmann et al., 2022). Thus, if current trends continue, the volume of plastic waste in the oceans could surpass that of fish by 2050 (Schmaltz et al., 2020). In response to this issue, governments around the world are implementing policies such as prohibitions on single-use plastics, requirements for minimum recycled content in packaging, and extended producer responsibility schemes (Knoblauch and Mederake, 2021). These regulatory measures are inspiring manufacturers to redesign products, invest in new recycling technologies, and adopt principles of the circular economy (Bolger and Doyon, 2019). In this context, the European Union has set ambitious targets for plastic packaging recyclability and recycled content. Also, international agreements like the Basel Convention are fostering greater global cooperation in managing plastic waste (Ghosh et al., 2016). However, the success of these regulations depends on three fundamental pillars: i.- effective enforcement, ii.- industry collaboration, and iii.- public participation. Is very important to stress, that beyond those pillars, a strong regulatory frameworks would be essential for driving the systemic changes needed to address the global challenge of plastic waste and promote sustainable polymer recycling.

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