

# Environmental Science: Advances

rsc.li/esadvances

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.

## IN THIS ISSUE

ISSN 2754-7000 CODEN ESANEB 2(12) 1609–1758 (2023)



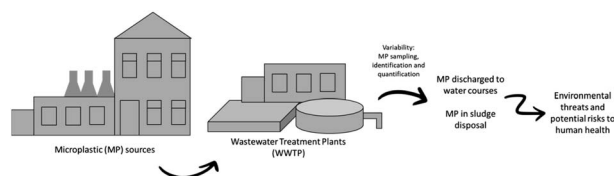
Cover  
Cover Image credit: © Artur Debat/Getty Images.

## TUTORIAL REVIEW

1616

### Fate and occurrence of microplastics in wastewater treatment plants

Daniela P. Mesquita,\* Cristina Quintelas and Eugénio C. Ferreira

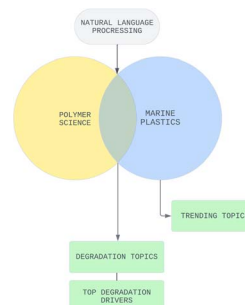


## PAPERS

1629

### Intersections between materials science and marine plastics to address environmental degradation drivers: a machine learning approach

Henrique de Medeiros Back,\* Daphiny Pottmaier, Camilla Kneubl Andreusi and Orestes Estevam Alarcon



**Editorial Staff****Executive Editor**

Emma Eley

**Deputy Editor**

Jon Ferrier

**Editorial Production Manager**

Sarah Whitbread

**Assistant Editors**

Jamie Purcell, Alexander John, Emily Ellison, Jack Pitchers, Clare Fitzgerald

**Editorial Assistant**

Alex Holiday

**Publishing Assistant**

Lee Colwill

**Publisher**

Neil Hammond

For queries about submitted papers please contact Sarah Whitbread, Editorial Production Manager in the first instance. E-mail: [esadvances@rsc.org](mailto:esadvances@rsc.org)

For pre-submission queries please contact

Emma Eley, Executive Editor.

E-mail: [esadvances-rsc@rsc.org](mailto:esadvances-rsc@rsc.org)

Environmental Science: Advances (electronic: ISSN 2754-7000) is published 12 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WF.

Environmental Science: Advances is a Gold Open Access journal and all articles are free to read.

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.

**Advertisement sales:**

Tel +44 (0) 1223 432246; Fax +44 (0) 1223 426017;

E-mail [advertising@rsc.org](mailto:advertising@rsc.org)

For marketing opportunities relating to this journal, contact [marketing@rsc.org](mailto:marketing@rsc.org)

# Environmental Science: Advances

[rsc.li/esadvances](http://rsc.li/esadvances)

Uniting disciplines to solve environmental challenges

**Editorial Board****Editors-in-Chief**

Zongwei Cai, Hong Kong Baptist University, Hong Kong

Kevin Jones, Lancaster University, UK

Célia M. Manaia, Universidade Católica Portuguesa, Portugal

**Associate Editors**

Ru-jin Huang, Institute of Earth Environment, Chinese Academy of Sciences, China

Liwu Zhang, Fudan University, China

Pernilla Bohlin-Nizzetto, Norwegian Institute for Air Research, Norway

David Weissbrodt, Norwegian University of Science and Technology, Norway

Ngai Yin Yip, Columbia University, USA

**Members**

Silvia Lacorte seult, IDAEA-CSIC, Spain

**Advisory Board**

Damià Barceló, Institute of Environmental Assessment and Water Research, Spain

Zhi-Feng Chen, Guangdong University of Technology, China

Jiping Chen, Dalian Institute of Chemical Physics, China

Chungheng Chen, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China

Saikat Dutta, Amity University, India

Maofa Ge, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China

Tom Harner, Environment and Climate Change Canada, Canada

Rong Ji, Nanjing University, China

Ramanan Laxminarayan, One Health Trust, Washington D.C., United States

Yongjie Li, University of Macau, Taipa, Macao

Hemi Luan, Guangdong University of Technology, China

Jurgita Ovadnevaite, National University of Ireland Galway, Ireland

Francois Perreault, University of Quebec Montreal, Canada

Debra Rodrigues, University of Houston, USA

Andreas Schäffer, Institute for Environmental Research, RWTH Aachen University, Germany

Philippe Schmitt-Kopplin, Helmholtz Zentrum München, Germany

Dörthe Tetzlaff, Humboldt University of Berlin and IGB Leibniz Institute of Freshwater Ecology and Inland Fisheries

Mark van Loosdrecht, Technische Universiteit Delft, Netherlands

Meizhen Wang, Zhejiang Gongshang University, China

Zhe Wang, Hong Kong University of Science and Technology, Hong Kong, China

Dengsong Zhang, Shanghai University, China

Xuan Zhang, University of California, Merced, USA

**Information for Authors**

Full details on how to submit material for publication in Environmental Science: Advances are given in the Instructions for Authors (available from <http://www.rsc.org/authors>). Submissions should be made via the journal's homepage: [rsc.li/esadvances](http://rsc.li/esadvances)

Authors may reproduce/republish portions of their published contribution without seeking permission from the Royal Society of Chemistry, provided that any such republication is accompanied by an acknowledgement in the form: (Original Citation)–Reproduced by permission of the Royal Society of Chemistry.

This journal is © The Royal Society of Chemistry 2023.

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.

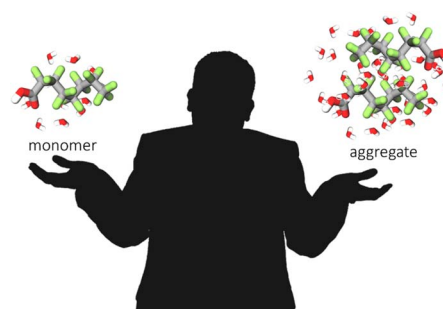
Registered charity number: 207890



1641

### Linear perfluoroalkyl carboxylate reduction dynamics with solvated electrons from ferrocyanide and sulfite

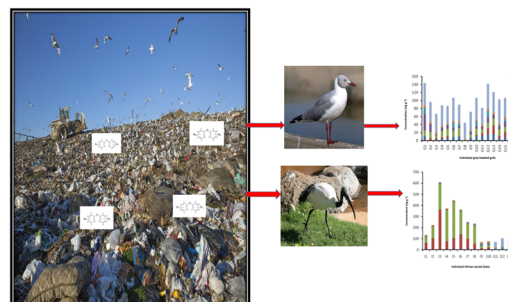
William A. Maza,\* James A. Ridenour, Brian L. Chaloux, Albert Epshteyn and Jeffrey C. Owrutsky



1651

### Polybrominated diphenyl ethers in the grey-headed gull (*Larus cirrocephalus*) and African sacred ibis (*Threskiornis aethiopicus*)

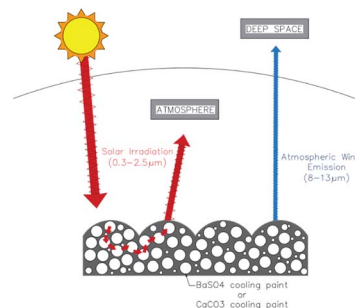
C. Emereole, R. Jansen and O. J. Okonkwo\*



1662

### Subambient passive radiative cooling effects of barium sulfate and calcium carbonate paints under Malaysia's tropical climate

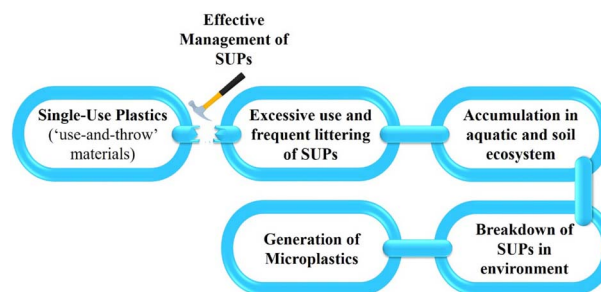
William Raphael Joseph, Jun Yeang Tan, Apurav Krishna Koyande, Ianatul Khoiroh,\* Jerry Joynson and Steve Willis



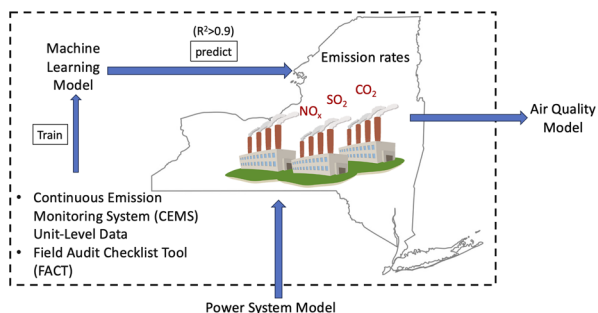
1680

### Management strategies for single-use plastics: lessons to learn from Indian approach of minimizing microplastic waste

Surya Singh and Mrinal Kanti Biswas\*



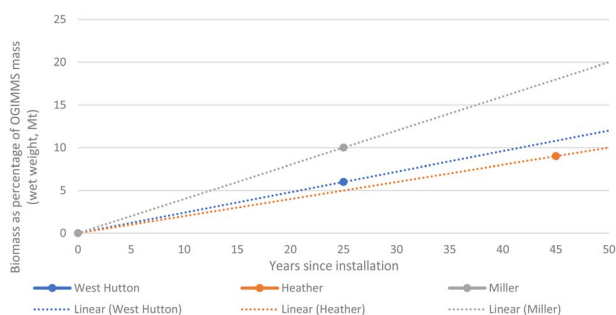
1696



## Predicting power plant emissions using public data and machine learning

Jiajun Gu, Jeffrey A. Sward and K. Max Zhang\*

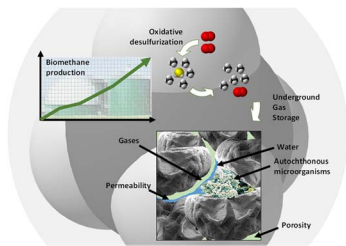
1708



## A first estimate of blue carbon associated with oil & gas industry marine infrastructure

Abigail J. Davies\* and Astley Hastings

1727

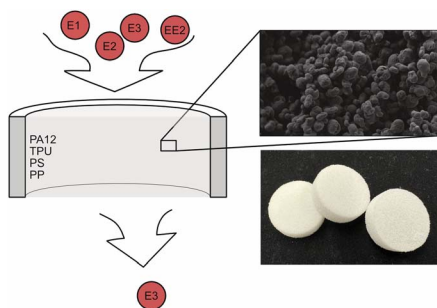


The massive arrival of biomethane in geological energy storage will lead to a potential co-conjunct of  $O_2$  used during the gas desulfurization process. In aquifer storage, this  $O_2$  will induce changes in the microbial community and interactions with the stored gas and the formation water.

## Physicochemical and microbiological effects of geological biomethane storage in deep aquifers: introduction of $O_2$ as a cocontaminant

P. G. Haddad, M. Ranchou-Peyruse, M. Guignard, J. Mura, F. Castéran, P. Sénéchal, M. Larregieu, M.-P. Isaure, P. Moonen, I. Le Hécho, G. Hoareau, P. Chiquet, G. Caumette, A. Petit, P. Cezac and A. Ranchou-Peyruse\*

1739



## Removal of estrogens from aqueous solutions using 3D-printed polymers

Janne Frimodig and Matti Haukka\*



1746

## Assessing sources and fractions of metals associated with environmental plastics: a case study in Lake Como (Italy)

Stefano Carnati, Andrea Pozzi, Davide Spanu, Damiano Monticelli, Roberta Bettinetti, Ginevra Boldrocchi, Luca Nizzetto and Gilberto Binda\*

