

# 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(10) 1275–1462 (2023)



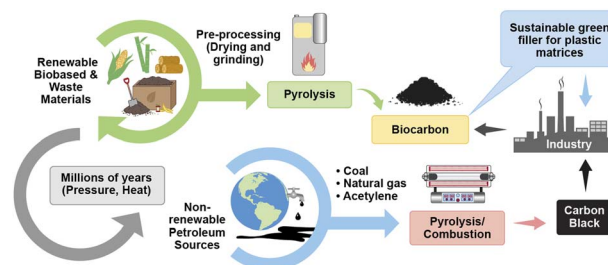
Cover  
© Donald Iain Smith / Getty Images.

## TUTORIAL REVIEW

1282

### Recent advances on value-added biocarbon preparation by the pyrolysis of renewable and waste biomass, their structure and properties: a move toward an ecofriendly alternative to carbon black

Drupitha MP, Manjusri Misra\* and Amar Kumar Mohanty\*

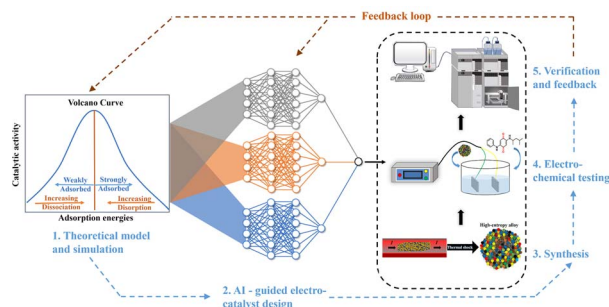


## PERSPECTIVE

1302

### AI-guided electro-decomposition of persistent organic pollutants: a long-awaited vision becoming reality?

Lin Zhu, Lei Du, Guodong Cao and Zongwei Cai\*



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

Emma Eley

**Deputy Editor**

Jon Ferrier

**Editorial Production Manager**

Sarah Whitbread

**Assistant Editors**

Aphra Murray, Jamie Purcell, Alexander John, Emily Ellison, Jack Pitchers

**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

Chun Cheng 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 at Montreal, Canada

Deborah 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

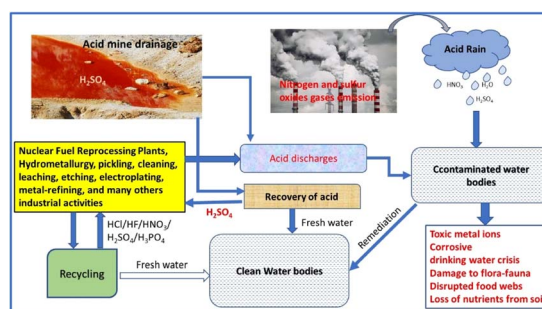


## CRITICAL REVIEWS

1306

### Remediation and recycling of inorganic acids and their green alternatives for sustainable industrial chemical processes

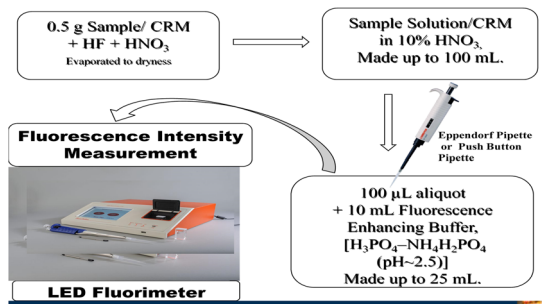
Chhavi Agarwal\* and Ashok K. Pandey\*



1340

### Application of a differential technique in laser-induced fluorimetry/pulsed LED-fluorimetry: simple and reliable analysis of uranium raw materials in the nuclear fuel cycle – a mini-review

D. P. S. Rathore,\* P. K. Tarafder, V. Balaram, M. Mishra, J. Pari, A. G. Bhujle and D. D. Bhawalkar

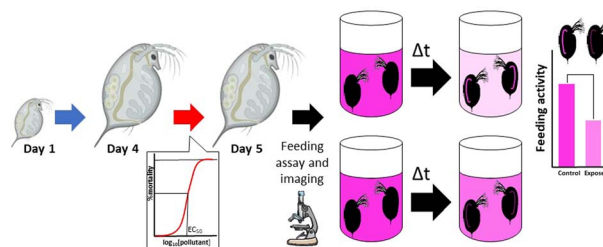


## PAPERS

1351

### Development and application of a sensitive feeding assay for daphnids based on the ingestion of fluorescent microparticles

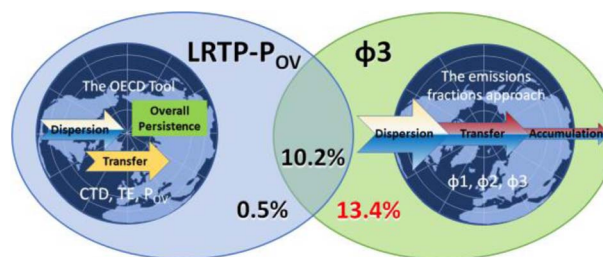
Maria Giannouli, Konstantinos Panagiotidis, Keith D. Rochfort and Konstantinos Grintzalis\*



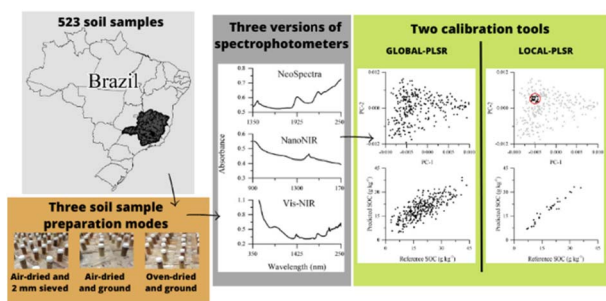
1360

### Added value of the emissions fractions approach when assessing a chemical's potential for adverse effects as a result of long-range transport

Knut Breivik,\* Michael S. McLachlan and Frank Wania



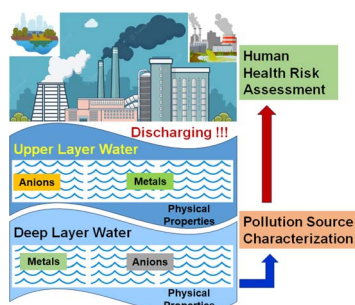
1372



### Large-scale measurement of soil organic carbon using compact near-infrared spectrophotometers: effect of soil sample preparation and the use of local modelling

Aymbiré A. Fonseca, Celio Pasquini\* and Emanuelle. M. B. Soares

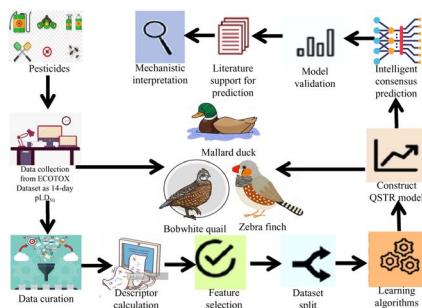
1382



### Layer-wise physicochemical and elemental distribution in an urban river water, Bangladesh: potential pollution, sources, and human health risk assessment

Tapos Kormoker,\* Md. Saiful Islam,\* Md. Abu Bakar Siddique, Sazal Kumar, Khamphe Phoungthong, Md Humayun Kabir, Kazi Farhed Iqbal, Rakesh Kumar, Mir Mohammad Ali and Abu Reza Md. Towfiqul Islam

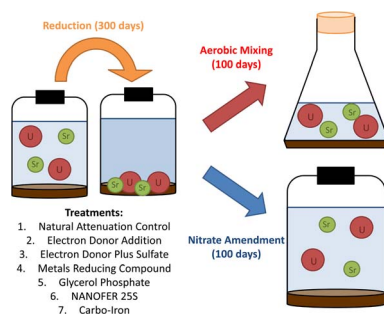
1399



### Exploring regression-based QSTR and i-QSTR modeling for ecotoxicity prediction of diverse pesticides on multiple avian species

Trina Podder, Ankur Kumar, Arnab Bhattacharjee and Probir Kumar Ojha\*

1423



### *In situ* (bio)remediation treatment options for U and Sr contaminated land: a comparison of radionuclide retention and remobilisation

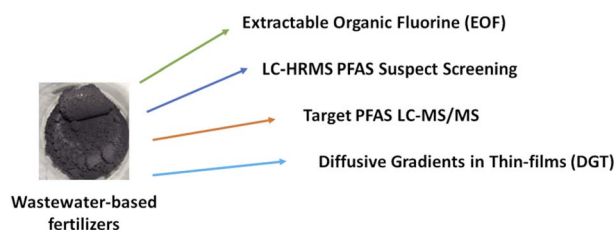
Gianni F. Vettese,\* Katherine Morris, Matthew White-Pettigrew, Luke T. Townsend, Samuel Shaw, Christopher Boothman and Jonathan R. Lloyd\*



1436

## Levels of per- and polyfluoroalkyl substances (PFAS) in various wastewater-derived fertilizers – analytical investigations from different perspectives

Christian Vogel,\* Philipp Roesch, Philipp Wittwer, Christian Piechotta, Jan Lisec, Thomas Sommerfeld, Stephanie Kluge, Hannes Herzel, Thomas Huthwelker, Camelia Borca and Franz-Georg Simon



1446

## Ensemble hybrid machine learning to simulate dye/divalent salt fractionation using a loose nanofiltration membrane

Nadeem Baig, S. I. Abba,\* Jamilu Usman, Mohammed Benaafi and Isam H. Aljundi

