Solar chemistry and photocatalysis: environmental applications

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Solar energy-mediated photocatalytic process is extensively applied for the treatment of water, wastewater, and air. Photoreactors are usually employed effectively to collect sunlight for the treatment of contaminated liquid and gas streams. Significant amount of research in this area has been carried out in the past few years to improve the efficiency of the solar-based photocatalytic processes by improving the catalytic activity and by designing new photoreactors.

This special issue of *Environmental Science and Pollution Research* contains a selection of 5 papers presented at the 10th European Meeting on Solar Chemistry and Photocatalysis: Environmental Applications (SPEA10), which was chaired by Dr. Sixto Malato and held in Almeria City, Spain, from 4 to 8 June 2018.

The history of SPEA started in the year 2000. Since then the meetings have been held every 2 years. The first meeting was held in Saint-Avoid (France), the second also in Saint-Avoid, and later in Barcelona and Las Palmas de Gran Canaria (Spain), Palermo (Italy), Prague (Czech Republic), Porto (Portugal), Thessaloniki (Greece), and Strasbourg (France).

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The number of participants have been growing since the beginning reaching more than 350 participants in Strasbourg and a similar number in Almería, at SPEA10.

The conference program included 5 plenary lectures, 85 regular oral presentations, 36 short-oral communications, and 250 poster contributions, in the field of solar chemistry and photocatalysis for water, wastewater, and air treatment, as also for green synthesis (including CO₂ photoreduction) and energy production.

The present collection includes articles dealing with new semiconductor photocatalysts for pollutants abatement in water and air streams. Although not exhaustive, the selection reflects the excellent perspectives for application of the processes described. Five papers are included in this special edition entitled as follows:

- (1) Hybrid UV-C/microfiltration process in membrane photoreactors for wastewater disinfection
- (2) Photocatalytic porcelain grés large slabs digitally coated with AgNPs-TiO₂
- (3) In situ evaluation of the NO_x removal efficiency of photocatalytic pavements: statistical analysis of the relevance of exposure time and environmental variables
- (4) Copper-doped TiO₂ photocatalysts: application to drinking water by humic matter degradation
- (5) Enhanced NO_x removal efficiency for SCR catalyst of well-dispersed Mn-Ce nanoparticles on hexagonal boron nitride

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Vítor J.P. Vilar is a principal researcher in the Laboratory of Separation and Reaction Engineering-Laboratory of Catalysis and Materials (LSRE-LCM), Faculty of Engineering, University of Porto (FEUP), since 2014. He earned his BSc in Chemical Engineering from the Faculty of Engineering of the University of Porto (FEUP) in 2001. He completed his PhD in Chemical Engineering at FEUP in 2006, in Environmental Technologies. In 2014, he was

awarded a 3-year “Special Visiting Researcher” grant, at the Federal University of Santa Catarina, Brazil, sponsored by the Brazilian *Ciência Sem Fronteiras* program. He is currently editor on *Environmental Science and Pollution Research (ESPR) Journal* (Springer). He has participated as a committee member or as program chair in nine international conferences on environmental engineering, delivering 38 plenary/keynote/invited lectures at international conferences and scientific institutions. He is member of the European PhD School on AOPs and president of the Iberoamerican Conference on Advanced Oxidation Technologies (CIPOA). His research interest focuses on the environmental assessment and monitoring of surface waters and environmental friendly technologies for pollution control, particularly in the application of advanced oxidation processes and electrochemical oxidation processes for water and air treatment; integration of physical, chemical, biological, and membrane processes for the treatment of recalcitrant wastewaters; and valorization of natural materials for separation and recovery of heavy metals, oil and grease, soil remediation, process integration and intensification, and water/waste recycling and valorization. He is author and co-author of more than 400 scientific publications, including 3 conference books, 10 book chapters, 5 editorials, 186 papers in peer-reviewed international scientific periodicals (*h* index: 41 and > 5300 citations), 8 papers in

national scientific periodicals, and more than 200 contributions in conference proceedings and a co-inventor of 2 patents, receiving 8 prizes in total. He participated in different R&D projects (5 international, 16 national, and 5 contracts with private companies). He has mentored 24 researchers, 31 master students, 23 PhD students, and 33 postdoctoral researchers.

Prof. Suresh C. Pillai obtained his PhD in the area of Nanotechnology from Trinity College Dublin and then performed postdoctoral research at California Institute of Technology (Caltech), USA. Upon the completion of this appointment, he returned to Trinity College Dublin as a Research Fellow before joining CREST-DIT as a Senior Research Manager in April 2004. Suresh joined IT Sligo as a Senior Lecturer in Nanotechnology in

October 2013. He is an elected fellow of the UK's Royal Microscopical Society (FRMS) and the Institute of Materials, Minerals and Mining (FIMMM). Suresh was responsible for acquiring more than €4 million direct R&D funding. He has published several scientific articles in leading peer-reviewed journals and has presented papers in several international conferences. He has delivered over 50 international invited talks including several keynote and plenary talks. His research work was featured in the BBC London, BBC World Radio, Times UK, “The Investigators (RTE TV)” program, RTE-1 TV News, Aljazeera TV, Ocean FM Radio, and a number of national and international news media. He was also the recipient of the “Boyle-Higgins Award 2019 from the Institute of Chemistry Ireland. He is an editor for the journal *Environmental Science and Pollution Research (ESPR, Springer)* and Editorial Board Member for the *Chemical Engineering Journal* and *Applied Catalysis B (Elsevier)*.

Prof. Sixto Malato focused his scientific career based on R&D projects linked to water decontamination by advanced oxidation processes. Concretely, he has been involved in 23 International (3rd-7th, H2020 EU Framework Programmes) and 30 National R&D Projects related to the development of solar wastewater treatment technologies and has been involved in the design and construction of all the experimental pilot

plants for solar photocatalytic treatment of water and wastewater in Europe. He is author of 1 book and co-author of 19 books as well as 56 chapters in others. He has also co-authored more than 260 publications in indexed international journals, more than 330 contributions to different International Congress and Symposiums, and 5 patents. He has participated as speaker in different specialized courses on Advanced Water Treatment. He has directed 16 PhD Thesis. More than 18,000 citations since 1996. H-index (July 2019): 76.

- Associated editor of scientific journals: Photochemical and Photobiological Sciences, Environmental Chemistry Letters and Journal of Advanced Oxidation Technologies. Member of editorial board of Catalysis Today
- Award Jaime I in Environmental Protection, 2011 (Most important in science in Spain). <http://www.fvea.es/medioambiente.html>
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