



## Appropriate technologies to combat water pollution

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This special issue contains 56 articles selected from the 10th annual international conference called “Challenges in Environmental Science and Engineering,” CESE-2017 that was held in Kunming, China from the 11th to the 15th of November 2017. There were 283 delegates from 16 countries and regions participated in CESE-2017. The conference covered 8 themes namely (i) the Application of Membrane Technology & Nano-Technology, (ii) Water & Wastewater: Pollution Prevention & Treatment, (iii) Resources & Wastes: Management and Recovery of Materials and Energy, (iv) Air Pollution: Prevention and Treatment, (v) Sustainable Catchments & Renewable Energy, (vi) Cleaner Production and Emerging Sustainable Practices, (vii) Appropriate Technology for Sustainability & Climate Change Adaptation/Mitigation, and (viii) Soil Sustainability and Contaminated Soils and Sediments. This special issue covers various aspects of adsorption, heavy metals, application of membranes, removal of pollutants, sludge management, stormwater, water quality, and treatment.

There are eight articles related to adsorption published in this special issue. Two articles provide research outcomes on CO<sub>2</sub> capture; one study used palm kernel shell-based activated carbon produced by direct physical activation, and another study used rice husk to enhance calcium oxide-based sorbent prepared from waste cockle shells for cyclic CO<sub>2</sub> capture in high-temperature condition. Next study discusses green synthesis of palm oil mill effluent-based graphenic adsorbent for dye wastewater treatment. One study discusses the preparation

and dynamic adsorption of p-nitrophenol by multi-walled carbon nanotubes dispersed cyclodextrin ( $\beta$ -CD-MWNTs). Adsorption of ibuprofen using cysteine-modified silane-coated magnetic nanomaterial is researched on article and adsorptive removal of endocrine-disrupting compounds, and a pharmaceutical using activated charcoal from aqueous solution was studied in another. Two articles have provided research on biochar where in one study persulfate activation with rice husk-based magnetic biochar was used for degrading PAEs in marine sediments and in another study, novel waste-derived biochar from biomass gasification effluent was prepared and characterization along with its application in biological wastewater treatment and energy recovery.

Another eight articles in this special issue provide valuable information of membranes and their applications in water/wastewater treatment. Four articles discuss membrane fouling under different conditions. One article evaluates the combined effects of coagulation and adsorption on ultrafiltration membrane fouling control and subsequent disinfection in drinking water treatment. The second article in this section investigates the role of organic fouling layer on the rejection of trace organic solutes by nanofiltration. The third article provides information on the role of specific organic foulants on separation performance of forward osmosis. The fourth article analyzes the fouling and performance of anaerobic ceramic membrane bioreactor treating phenol and quinoline containing wastewater. The next two articles discuss membrane bioreactors (MBRs) and deals with the limitations imposed by conventional fine bubble diffusers on the design of a high-loaded membrane bioreactor (HL-MBR), and the other provides a critical review on understanding the mechanisms of trace organic contaminant removal by high retention membrane bioreactors. The next article of this section evaluates the performance of integrated adsorption-solar photocatalytic membrane reactor for degradation of hazardous congo red using Fe-doped ZnO and Fe-doped ZnO/rGO nanocomposites. The last article evaluates the removal of nitrate from groundwater using negatively charged nanofiltration membrane.

Twelve more articles are dedicated to catchments where fate of pollutants in catchments, microbial communities and their

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roles, health of river and watershed as well as wetlands and water/sediment interactions are researched well. The following are discussed in detail in those articles: (i) occurrence, removal, and environmental risk of five drugs of abuse in urban wastewater systems in South Australia, (ii) changes of microbial communities during removal of natural and synthetic glucocorticoids in three types of river-based aquifer media, (iii) inhibition of microalgal blooms in park water by aquatic macrophytes, (iv) assessing the impacts of climate change on habitat of *Coregonus ussuriensis* in Chinese rivers using a water temperature model, (v) isolation and characterization of phosphate solubilizing bacteria from rhizosphere soils of the Yeyahu Wetland in Beijing, China, (vi) application of *Escherichia coli* antibiotic resistance patterns for contamination source identification in watershed, (vii) water pollution and observation of acquired antibiotic resistance in Bayou Lafourche, a major drinking water source in southeast Louisiana, USA, (viii) different pollutant removal efficiencies of artificial aquatic plants in black-odor rivers, (ix) evaluation of constructed wetlands for treating saline wastewater containing heavy metals, (x) effect of metals on zooplankton abundance and distribution in the coast of southwestern Taiwan, (xi) an integrative assessment to determine the sediment toxicity of Kaohsiung Harbor in Taiwan: combining chemical analysis and cytotoxicity assay, and (xii) the effects of light, microbial activity, and temperature on lincomycin transformation in aquaculture pond water and sediment.

Thirteen articles deal with the removal of pollutants by various technologies. Decomposition of aromatic hydrocarbon catalyzed by the dioxygenase system and substitution of ferredoxin and ferredoxin reductase, removal of  $17\alpha$ -ethynyl-estradiol by  $\text{TiO}_2$  (B) nanobelts, application of two reusable phosphotungstic acid salts/reduced graphene oxides composites with enhanced photocatalytic activity, and photoelectrocatalytic degradation of atrazine by boron-fluorine co-doped  $\text{TiO}_2$  nanotube arrays have been discussed in four articles. They provide insight into catalysis and photocatalytic degradation of pollutants. Three different aspects of nutrients namely the characteristics of vegetable crop cultivation and nutrient releasing with struvite as a slow-release fertilizer, the performance and recovery of a completely separated partial nitrification and anammox process treating phenol-containing wastewater, and phosphorus removal from wastewater using eggshell ash are discussed in the next three articles. A full-scale study of external circulation sludge bed (ECSB) system for anaerobic wastewater treatment in a whisky distillery, biodegradation of phenol by *Acinetobacter tandoii* isolated from the gut of the termite, dispersant-modified iron nanoparticles for mobility enhancement and TCE degradation, remediation of TCE-contaminated groundwater using  $\text{KMnO}_4$  oxidation, degradation of naproxen in chlorination and UV/chlorine processes, and the formation characteristics of carbonaceous and nitrogenous disinfection by-products depending on residual organic compounds by flocculation process are discussed in the subsequent articles.

Two articles describe transfer of pollutants where transfer of chemical elements from soil to plants and dissipation of polycyclic aromatic hydrocarbons (PAHs) in soil amended with sewage sludge and sludge compost are researched. Further, three articles describe topics related to sludge management. A novel method for sewage sludge composting with bamboo charcoal as separating material, a deep dewatering process of sludge by chemical conditioning and its potential influence on wastewater treatment plants and adsorption and regeneration characteristics of phosphorus from sludge dewatering filtrate by magnetic anion exchange resin are included in this section.

One article provides information on solid waste management and four other articles provide information on synthesizing products from various materials. Articles on Sustainable solid waste management system using multi-objective decision making model: a method for maximizing social acceptance in Hoi An city, Vietnam; Recycled gypsum board acted as a mineral swelling agent for improving thermal conductivity characteristics in manufacturing of green lightweight building brick; Enhancement of phytoextraction by Taiwanese chenopod and Napier grass by soapnut saponin and EDDS additions; Production of gasoline range hydrocarbons from catalytic cracking of linoleic acid over various acidic zeolite catalysts; and Optimization of physical parameters for enhanced production of lipase from *Staphylococcus hominis* using response surface methodology, show the diverse research attempts in material management and synthesis.

Two articles on water treatment and two articles on stormwater management are also included. While articles on the utilization of extracts of *Musa paradisiaca* (banana) peels and *Dolichos lablab* (Indian bean) seeds as low-cost natural coagulants for turbidity removal from water and the impact of ozonation and biologically enhanced activated carbon filtration on the composition of micropollutants in drinking water cover the water treatment aspects, articles on the performance of a kerb side inlet for irrigation of street trees and the influence of rainfall intensity and land slope on suspended substance and phosphorus losses in runoff are discussing the two important aspects of stormwater. Last but not least, an article on comparative health risk of inhaled exposure to organic solvents, toxic metals, and hexavalent chromium from the use of spray paints in Taiwan covers air pollution and associate health risks.

The guest editors of this special issue are thankful to the Editor-in-Chief of *Environmental Science and Pollution Control* Journal, Professor Garrigues, and the publishing editor Alexandrine Cheronet for providing an opportunity to publish selected peer-reviewed papers that were presented at CESE-2017. Thanks are also due to Ms. Fanny Creusot, Editorial Assistant, and the entire production team of the journal for their valuable support in bringing out this issue successfully. Last but not least, our sincere appreciation to all the reviewers for their invaluable and critical review comments on manuscripts that were submitted for this special issue.



**Eldon Raj Rene** is a senior lecturer of Resource Recovery Technology at UNESCO-IHE, Institute for Water Education (Delft, The Netherlands). His research majorly focuses on the development of biological treatment processes for wastewater and waste gas treatment, non-point source pollution prevention, resource recovery from waste gases, the use of artificial intelligence tools for environmental monitoring, environmental process control, and eco-industrial parks. He

has authored two books on Sustainable Heavy Metal Remediation (Vols. 1 and 2, published in 2017 by Springer), and he currently serves as the managing editor for *Reviews in Environmental Science and Bio/Technology* (Springer) and as an associate editor of the *Journal of Environmental Engineering* (ASCE-JEE). He is also the two-time recipient of the Young Scientist Award conferred by the Challenges in Environmental Science and Engineering conference organizers in Sydney (Australia) and Kaohsiung (Taiwan), respectively. In 2007, he was awarded the Juan de la Cierva fellowship by the Ministry of Science and Innovation (Spain). Eldon has also edited special (thematic) issues and volumes in the following journals: *Bioresource Technology*, *International Biodeterioration & Biodegradation*, *Journal of Environmental Management*, *ASCE-Journal of Environmental Engineering*, *Journal of Hazardous Materials and Environmental Science and Pollution Research*. He is a life member at the International Bioprocessing Association (IBA). He is the co-chair of the following international conference series: Challenges in Environmental Science and Technology (CESE), Research Frontiers in Chalcogen Cycle Science & Technology (G16), and Alternative Fuels, Energy and Environment (ICAFEE). As a part of his capacity building initiative, Eldon regularly conducts scientific writing and skill development workshops at major international conferences/meetings, as well as for students from developing countries.



**Dr. Li Shu** is the Managing Director of LJS Environment, Australia and a Guest Professor at Shandong Normal University. She was a Senior Researcher at RMIT University, Australia until December 2016. Shu has more than 150 publications in forms of book, book chapters, journal papers, and refereed conference papers. She obtained her bachelor degree from Qingdao University of Science and Technology, China; master degree from Asian Institute of Technology, Bangkok;

PhD from University of New South Wales, Sydney. She with her students and colleagues is the first to document images of water clusters taken by a microscope. They also proposed the structure of water, which will be published soon. With the proposed structure of water mysterious behaviors of water could be explained. The research group reported that pH of neutral salt was not 7 and the neutral salt was corrosive. Dr. Li Shu proposed that strong electrolyte such as NaCl existed in water as aggregates in 2005. The concept has been supported using a Nanosizer (Malvern) and results were published in 2013 and 2017. Li Shu's research interest is in water and wastewater treatment using membrane filters, resource recovery, and zero liquid discharge. Various membranes and nanoparticles have been employed for water and wastewater reclamation. She taught water and wastewater systems to undergraduate and postgraduate students. She is one of the founders of an International Conference "Challenges in Environmental Science and Technology," CESE and has been the Co-Chair of the Conference since 2008. She is an Editorial Board Member of *Austin Environmental Sciences* and *SM Journal of Environmental Chemical Engineering*. She is a guest editor of the following journals: *Bioresource Technology*; *Desalination and Water Treatment*; *International Biodeterioration and Biodegradation*; *Water, Air and Soil Pollution: Focus*; *Reviews in Environmental Science and Bio/Technology*; *Membrane Water Treatment*.



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projects include modeling disinfectant decay and biofilm growth, recirculating aquaculture systems, sewer gas mitigation, and the treatment of carwash water for reuse. Jega is the founder and Chairman of the international conference series on Challenges in Environmental Science & Engineering (CESE). He has over 300 publications including more than 135 peer-reviewed journal articles and five edited books. Jega is also the managing guest editor of 40 special issues in peer-reviewed journals, an editorial board member of two Elsevier journals and one prestigious open access journal on membranes. Additionally, he is the editor-in-chief of a book series entitled *Applied Environmental Science and Engineering (AESE)* for a Sustainable Future published by Springer.