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# Editorial: Recent Advances in Pond and Algal Technologies for Wastewater Treatment and Resource Recovery

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In a global scenario of increasing energy prices and quest for sustainable human activities, wastewater treatment in the XXI century must undergo a dramatic revision of its current practices. These must aim at developing a new generation of energy-efficient and resource-recovery processes, whilst complying with the ever-stricter environmental regulations.

Wastewater treatment using photosynthetic microorganisms can benefit from the knowledge coming from the use of algae to produce biofuels, food supplements or green pharmaceuticals and of microbial physiology of purple photosynthetic bacteria. Likewise, wastewater as a cheap source of nutrients and inorganic carbon is promising for the mass production of algae-based commodities. This technology platform is driven by solar energy and supported by complex interactions among microalgae, cyanobacteria, heterotrophic and autotrophic bacteria, which exert multiple synergistic and antagonistics effects during wastewater treatment. Overall, microalgae-based treatment systems may reduce wastewater treatment costs via recovery of its inherent material and energy resources, while providing a low-cost biomass that can be used as a feedstock for bioenergy or biofertilizer/biostimulant production.

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This special issue is grounded on the *2nd IWA Conference on Algal Technologies and Stabilization Ponds for Wastewater Treatment and Resource Recovery* (IWAlgae2019) held in Valladolid (Spain) in July 2019 together the *12th IWA Specialist Group Conference in Wastewater Pond Technology*. The event gathered 275 scientists, algaeneers and practitioners that exchanged for 2 days the latest knowledge on the application of photosynthetic microorganisms for wastewater treatment and resource recovery. The unprecedented success of this IWA specialist group conference was triggered by the active research in a field that has exponentially increased over the past decade

This special issue brings the latest discoveries on the potential of microalgae to grow in high strength (i.e digestates) and domestic wastewaters, to remove emerging pollutants and pathogens. The efficiency of novel photobioreactor configurations such as twin-layer or algal turf systems is also reviewed. The mechanisms and recent advances of microalgae harvesting will be discussed along with the main findings of the molecular analysis of microbial populations in continuous photobioreactors treating wastewater. The potential of computational fluid-dynamics for the design of microalgae-based wastewater treatment will be also reviewed. Finally, novel algal biomass valorization strategies will be presented.