

Editorial

# Special Issue on “New Processes: Working towards a Sustainable Society”

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The idea of a sustainable society comprises a consumer society that considers the welfare of the planet for future generations. A sustainable society would include a clean environment with clean air and water; human appreciation of the natural environment; no dependence on fossil fuels; materials being fully recycled for the creation of products; and an interconnection between the ecosystem and the digital network. A society that can maximize the utilization of resources and sustain a zero-waste bioeconomy will enable growth in both per capita consumption and the population. Many societies have yet to develop a vision of what a truly sustainable society could look like. Important aspects such as basic material usage, new energy sources, production factory organization, developments in communication, transportation, and machinery, and the transition from science to industry could majorly contribute towards improving the technological advancements within a society. An Industrial Revolution in these areas would lead to changes to the domestic system of industrial production and increase overall wealth and production capacity. The creation of a sustainable society is essential to create a future for future generations in which the sustainable development goals (SDGs) will be achieved and the natural ecosystem of the Earth will be preserved. This Special Issue, entitled “New Processes: Working towards a Sustainable Society”, showcases the advancements in sustainable processes and technologies that can provide an environmentally friendly management system. The Special Issue is available online at: [https://www.mdpi.com/si/processes/sustainable\\_society](https://www.mdpi.com/si/processes/sustainable_society).



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## 1. Nanotechnology in Materials and Bioprocessing

Nanomaterials have recently emerged as a class of modern materials that have unique characteristics such as thermal, electrical, optical, and magnetic properties, which are highly desirable in applications to advanced materials and bioprocessing. The integration of nanomaterials into existing structures can significantly boost the capability of these structures, which is a big advancement in science and technology. Rezaei et al. [1] employed the incorporation of nano iron oxide into PCL nanofibers to create a composite scaffold with enhanced performance. This study showed that incorporating magnetite nanoparticles into PCL fibers greatly improves the cell attachment and promotes the cell growth rate, which will provide better biological performance, especially in liver tissue engineering. In the review by Taghizadeh et al. [2], the potential of iron-based nanostructures was analyzed and reviewed comprehensively. The structural properties, methods of synthesis, and various applications of iron-based nanostructures were discussed with regard to their utilization in medicinal and technological development. Transforming iron compounds so

that they have nano iron structures yields better and useful properties that mean they can be employed in biomedical, industrial, environmental, agriculture, and engineering fields.

## 2. Sustainable Adsorption and Wastewater Treatment

Water resources are severely impacted by eutrophication and pollution caused by human activities and industrial processing. These harmful compounds can be discharged improperly into lakes, rivers, and oceans, where they have devastating effects on both human and aquatic health. Three papers in this Special Issue present adsorption techniques for use in wastewater treatment and in the slow release of nutrients. Alhogbi et al. [3] presented a green removal process for dye molecules from wastewater using activated carbon from waste. Palm tree fiber waste was used to synthesize activated carbon, which was found to be highly efficient in the removal of Congo red anionic dye and Rhodamine B cationic dye. The synthesized activated carbon also showed good reusability for up to five cycles and could be easily removed from the wastewater. Gheju and Balcu [4] also explored the use of an inexpensive walnut shell waste material as an adsorbent for the removal of iron and chromium heavy metals in water treatment. Fresh walnut shell powder was shown to be very promising in the removal of the heavy metals. The results indicated that it was suitable for application in water treatment processes as a sustainable solution that can reduce the amount of waste generated and assist as an efficient disposal method. Zhang et al. [5] focused on the use of ion exchange resin to control the adsorption and release of ammonia nitrogen in an attempt to produce a slow-release insecticide. Various parameters were altered so the response of the ion exchange resin could be observed, and it was found that the resin had a good adsorption effect on the ammonia nitrogen. This study provided insights into alternative raw materials for use in slow-release insecticides that can improve the utilization rate of biogas slurry and encourage the cleaner processing of insecticides.

## 3. Process Management and Analysis for Sustainable Biomass Utilization

Many technologies have been used to determine the sustainability of biomass utilization, either through economic, environmental, or social sustainability means. In different technologies, assessment methods and multi-criteria decision-making methods have been utilized to help researchers prioritize sustainable biomass utilization. Moy et al. [6] studied the life cycle assessment of bioplastic and paper straws in Malaysia. This study was carried out with the aim to environmentally assess the usage of plastic straws within the region, with emphasis on the global warming potential, acidification potential, and eutrophication potential. The outcome of the study indicated that bioplastic straws were favored as a material with less environmental impact than paper straws, which indicates that the materials used to make straws should be changed in Malaysia. Abad-Segura et al. [7] also introduced industrial process management for a sustainable society. This study analyzed many bibliographies regarding industrial process management and its sustainable effects on society; the work can serve as a platform for researchers to understand the growing trends in achieving sustainable societies and goals. Huy and Phuc [8] also discussed a structural model regarding the impact of corporate social responsibility (CSR) activities and how they encourage better organizational performance. Based on the data gathered from respondents in a public sector organization in South Vietnam, it was found that the integration of CSR activities into public sector management does impact the CSR disclosure and organizational performance, and implications for management were also outlined.

## 4. Optimization and Modeling for Enhanced Performance

Industrial processes in various fields and applications are complex, and to enhance them to enable better outputs, large amounts of resources and time are needed. Modeling and optimization tools have been used to evaluate the complexity of systems, develop strategies to optimize systems, select appropriate mathematical models that can represent systems, and to progress towards the commercialization of the process based on inputs from

modeling. Usman et al. [9] demonstrated the use of a response surface methodology (RSM) optimization technique to evaluate the performance, exhaust emissions, and acoustics of a compression ignition engine when applied with hydroxyl-gas-enriched diesel. Several parameters were altered to determine the level of their influence on the engine. The RSM model was able to predict the suitable range of conditions based on the studied factors (brake thermal efficiency, brake specific fuel consumption, hydrocarbon content, carbon monoxide content, noise, and smoke). Hamzah et al. [10] also highlighted the use of varying alcohol concentrations on the precipitation of lignin from a bamboo-like stem crop. Different concentrations of ethanol was used to observe the purity of precipitated lignin from *Miscanthus x giganteus*. The study showed that the overall size of lignin aggregates decreased with lower ethanol concentrations. The study provided findings regarding the ethanol concentration range suitable for obtaining better-quality lignin aggregates.

This Special Issue covers a broad range of topics that all aim to contribute to the movement towards a sustainable society. For this to be achieved, the highest standard of wellbeing must be provided for the environment, humans, and the economy, through actions that are energetically, resource, environmentally, and socially sustainable.

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