

Chemistry of Biofuels-Editorial

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Editorial

Innovative fuels and fuel-related research is one of the most fascinating and difficult fields in which academics, industry and governments are collaborating to find alternative and sustainable energy sources. It is clear how crucial and necessary it is for the entire community to concentrate on biomass-derived compounds to replace fossil fuels (e.g., oil, charcoal). With the introduction of the concepts of sustainability and sustainable growth in the 1980s, it became apparent that there was a pressing need to reduce waste, pollution, and CO₂ emissions caused by human activities. More precisely, the importance of chemistry in defining a more effective chemical production system based on what are now known as the twelve principles of Green Chemistry, which were first proposed by Anastas and Warner. One of the twelve principles is based on the preference for sustainable feedstock with a lower CO₂ footprint, demonstrating the strong relationship between green chemistry and biomass-derived fuels science (or biofuels).

Biofuels (and biofuel additives) have been around since the dawn of time. Indeed, more than a century ago, Henry Ford and Rudolph Diesel, the two giants of modern car engines, believed strongly in the future of biofuels and started using ethanol and vegetable oils to power the Ford Model-T and the diesel engine, respectively. The technologies focused on the use of biofuels were set aside as the value of oil increased significantly. As previously stated, there is an urgent need to reduce fossil fuel usage, but advanced chemical manufacturing is still critical for maintaining a high level of civilization and creating new job opportunities. Governments in a number of countries have launched unique initiatives. For example, the European Union (EU) has set a target for renewable fuels in the transportation sector to account for 10% of total fuel consumption by 2020. Furthermore, fuel suppliers would reduce the greenhouse gas intensity of the EU's fuel mix by 6% by 2020. (European Union, 2009). Biofuels must be generated in a sustainable manner to efficiently reduce greenhouse gas emissions (European Union, 2009). To begin, sustainable feedstock (such as lignocellulose residues from agriculture and forestry, fast-rotation nonedible crops, organic fractions of urban waste, and algae) must be chosen to save at least 35% net CO₂ emissions when compared to fossil fuels (European Union, 2009). Second, the processing of biofuels can provide some benefits to local communities (including food availability, new job opportunities, biodiversity perseverance, quality of water and soils used). Furthermore, a sustainable and effective biofuel manufacturing process should be focused on clean and safe manufacturing processes with minimal waste generation.

The current issue of Biofuel Research Journal contains a set of contributions that exemplify the journal's significance in this field. In the field of biofuels, solid state fermentation, waste valorization, and biogas are all critical topics. They also demonstrate how important it is to combine all of the concepts of green chemistry in order to meet the requirements for a new biofuels development. Advanced methods such as Life Cycle Assessment (LCA) and beyond are critical for thoroughly evaluating the efficiency of a process. To support the quality of contributions to this field, metrics assessing the waste associated with a process (e.g., E-factor, etc.) should be encouraged in addition to rigorous LCA evaluations. Overall, developing heterogeneous and recoverable catalytic systems capable of operating in safer media and allowing the isolation of the target materials with the least amount of waste and energy consumption will be critical for future biofuels research. All of the latest reaction technologies, such as ultrasounds, microwaves, and continuous-flow reactors, can be used to achieve these goals, and they represent an effective and exciting range of key tools for innovating the future of green chemistry and biofuels. Finally, green chemistry and biofuels are two sides of the same coin that will undoubtedly travel together for a long time, sharing many fun adventures.