

Editorial

There is a consensus today that the development of an economy based on renewable resources is strongly dependent on an urgently needed new industrial platform to replace, at least partially, the petrochemical industry.

Biorefinery is certainly one of the most relevant new concepts capable of responding to this call for renewable raw materials and renewable energy. The most important characteristic of a biorefinery platform is the combination of production of energy/fuel and materials. The majority of products are focused on energy and fuels, the utilization of source of materials being a complementary activity. Despite its small scale in comparison to energy and fuel, the production of materials from renewable resources is of crucial importance and fundamental to the sustainability of the modern industry.

One of the first successful biorefinery platforms that has been proven effective at industrial scale is first generation ethanol production. The conventional ethanol plant is derived from the sugar industry and works on the basis of fermentation of sucrose liberated by crushing sugarcane culms. The required energy for the plant operation is obtained by burning sugarcane bagasse, and the excess energy is used to produce electricity to the grid.

Ethanol is also produced from other sucrose sources, such as sugar beet and starch-containing crops like corn and potato, after an enzymatic treatment to yield glucose.

The residual lignocellulosic residues that result from this ethanol production (bagasse, stems, leaves, husks, etc.) increasingly constitute an important source of products and fuels. All lignocellulosic substrates can be converted into ethanol after enzymatic or chemical hydrolysis to glucose and subsequent fermentation (second generation ethanol). The released sugars can also be the source of important building blocks for the

chemical industry. The chemicals obtained from cellulose and other polysaccharides from the plant cell walls can lead ethanol biorefinery to a new stage of development, demonstrating its vocation to be one of the most important industrial platforms of biorefinery in the near future.

This special issue focuses on materials from renewable resources related to second generation ethanol production, particularly from sugarcane. The production of sugar/ethanol/energy in Brazil is one of the first real platforms of biorefinery in operation nowadays, being responsible for 25% of total fuel of conventional non-diesel engines and 3% of its energy. The emerging second generation ethanol is strategic to supporting the rise of biorefineries based on the first- and second-generation ethanol fuel.

This issue contains manuscripts on biorefinery and its products from sugarcane, studies on the nanostructure of cellulose, the saccharification process using enzymatic processing, nanocelluloses, as well as pulp and paper from sugarcane biomass.

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