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Food security versus lignocellulosic ethanol in Brazil

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Around mitigation policies and global macroeconomics changes, it can be realized the spreading of sugarcane ethanol production in southeast of Brazil. This is partly consequence of deregulatory moving in the 90's and the revival of that sector to supply flex fueled fleet demand after 2003. This moving has inspiring debates in two antagonistically lines: the first one assumes that the regional moving of sugarcane to both Brazilian Central-West (Centro-Oeste) and North (Norte) regions can compete against food crops potentially affecting Brazilian food security and putting in risk the Amazon biome. In the other hand, from a positive point-of-view, it assumes that the lignocellulosic ethanol can increase the efficiency and the productivity of ethanol and others derivatives on biochemistry chain which means the adoption of more fibrous and less sugary variety of cane (energy cane). The target of this paper is to verify the benefits of this new step of ethanol production (2G) in the context of climate changes, facing the risk of decrease of food supply and pushing cattle's to forestland. The potential tradeoff between lignocellulosic ethanol and food security can widen the debate on bioenergy as way to mitigate climate changes. In this way this paper will elucidate that debate in order to allow policymakers to correct focus to a more adequate way to promote renewable energy.

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Steam reforming of biomass derived oxygenates to H_2 and study of effect of ZrO_2 on new Ni/ZnO-based catalysts

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Most research on the production of H_2 from biomass resources has focused on the well-known technology of reforming applied to biomass-derived alcohols, since alcohols are an efficient and easy to handle. Among the alcohols, bioethanol has been largely used due to its large-scale production; furthermore, the H_2-content is relatively high per unit of ethanol molecule and ethanol is easy to manipulate. In research on H_2 production, glycerol, an alcohol by-product of biodiesel production, has also been considered as an attractive substrate for producing H_2 via reforming processes. In the transesterification process for the biodiesel production, glycerol forms as a ca. 10 wt% by-products and it needs to be removed. New substrates such as biobutanol, have also received research attention recently. When butanol is produced by fermentation of sugary biomass, a raw mixture (ABE) containing n-butanol, acetone and ethanol is obtained after preliminary distillation of the fermentation liquid, and the use of this reactant mixture as feedstock for H_2 production is favorable in terms of energy because no further distillation is necessary. On the other hand, n-butanol possesses high hydrogen content than ethanol. The presence of acetone in the ABE mixture and the fact that acetone is also considered a model compound of bio-oil has also prompted research in reforming processes for H_2 production from acetone. In the reforming processes all share the requirement of an effective catalytic system to be used. The catalysts for the reforming processes of the above considered oxygenated compounds must possess an efficient capacity to breakdown the C-C bonds without forming undesirable by-products at relatively low temperatures, while maintaining resistance to coking. Several metals have been used as active phases for catalytic steam-reforming of alcohols, mainly Ni, Co and noble metals. However, from the point of view of practical economics purposes, the use of Ni-based catalysts is highly desirable. However, the formation of carbon deposits is a main drawback in this case. The goal of this work is to present our research in the study of the effect of ZrO_2 component in new Ni/ZnO-based catalysts for the steam reforming of ethanol, acetone and glycerol to produce H_2.

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