Matteo Compagnoni, Int J Petrochem Res. 2017
http://dx.doi.org/10.18689/2638-1974.a1.004

Hydrogen production by reformation of Bio-ethanol

Matteo Compagnoni
University of Milan, Milano

The project was focused on the hydrogen production through steam reforming starting from 2nd generation bioethanol as raw material. This source is very attractive because of its relatively high hydrogen content, availability, non-toxicity, storage and handling safety. More importantly, it can be produced renewably by biomass fermentation on a large scale. In this research we used a unit capable of delivering 5 $kW_{electrical}$ + 5 $kW_{thermal}$ output, which is being tested in a demonstrative project c/o Dept. of Chemistry at UniversitàdegliStudi di Milano. A PEM fuel cell was used for heat and power cogeneration and reformates purification from CO was accomplished by well established routes, such as water gas shift and methanation. The water/ethanol feeding ratio is a pivotal parameter influencing thermodynamics and kinetics of the main reactions, catalyst deactivation by coking and the possibility to adopt less expensive routes for bioethanol purification (e.g. a flash column leading to ca. 50% bioethanol solution). The effect of bioethanol concentration has been here investigated. At first, two different bioethanol solutions, 50 vol% and 90 vol%, have been used to test different catalysts for the steam reforming reaction at different temperature (300-750°C). An increase of water/ethanol ratio improved H_2 yield due to promotion of the WGS reaction and lower impact of the hydrogen-consuming methanation step at the expenses of higher heat input to the reformer. The presence of a high enthalpy exhaust steam increased the available thermal output, with consequent increase of the thermal and overall efficiency of the plant.

Biography:

Matteo Compagnoni presently works in the research group of Prof. Ilenia Rossetti in the University of Milan. He is graduated in industrial chemistry in 2014 with 110/110 *cum laude*. He is co-author of 14 scientific papers and attended more than 18 national and international conferences with oral and poster contributions. His present project is focused on the catalytic and photocatalytic production of fuels and chemicals from fossil and renewable sources.