

## Development of Ni Based Catalysts for the Destruction of Tars Generated in the Biomass Synthesis Gas (syngas) Production Process

Xianchun Zhu, Mark Bricka. Mississippi State University

In recent years the process for the production of synthesis gas (syngas) from bio-mass has grown in popularity. Unfortunately, the syngas produced from biomass gasification generally is contaminated with tar which is a complex mixture of polynuclear aromatic hydrocarbons. This tar can cause problems with the downstream processing of the syngas such as clogging filters, deactivating syngas conversion catalysts, and coating and clogging the process piping as the gas cools.

Techniques to treat tars in the crude syngas are a necessary step for the biomass gasification process. In the project, syngas was spiked with naphthalene (used as the model compound for tars) and its destruction was investigated using low cost catalysts. Two clays with different surface area were screened for be used as catalyst supports. Montmorillonite has a relatively large surface area around 239 m<sup>2</sup>/g, while kaolinite has a surface area of 10~50 m<sup>2</sup>/g and these were the material studied. These catalysts were prepared with/without the presence of sucrose. The catalysts were characterized using TEM, XRD, TGA and TPR. It has been observed that the inclusion of sucrose during the impregnation step greatly improved the dispersion of the nickel catalysts for both clays evaluated.

The activity of prepared catalysts was evaluated with 60 g/N<sup>3</sup> naphthalene in the syngas (CO, 20%, CO<sub>2</sub>,9%, CH<sub>4</sub>, 3%, H<sub>2</sub>, 20%, balance, N<sub>2</sub>). The steam to carbon ratio was 5. The catalysts were evaluated at 650 and 750 °C. Preliminary results indicate that the addition of sucrose changed the reducibility profile of the catalysts. The catalysts prepared with sucrose showed higher initial activity for 3 hours comparing to around 1 hour for the catalysts without inclusion of sucrose in the impregnation step. In this presentation, details of the catalyst preparation method as well as its effectiveness for tar destruction will be presented.