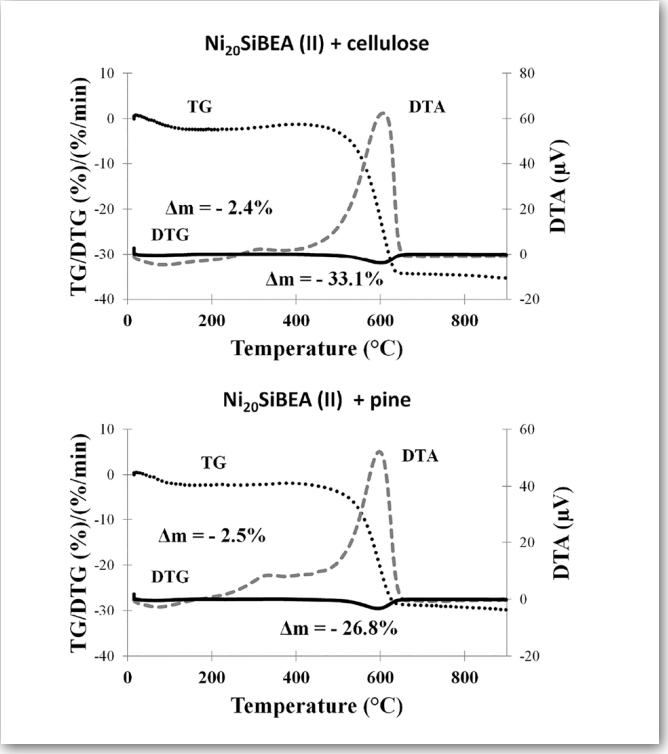
Characterization of a catalyst used for the hydrogen production

INTRODUCTION

To reduce our dependence on fossil fuels, we must diversify our energy solutions. Biomass is an abundant and renewable raw material. The transformation of biomass into hydrogen-rich gas requires catalysts that optimize this reaction. These catalysts accumulate carbon during the reaction, which affects their efficiency.
The amount and reactivity of carbon deposited on the catalyst during biomass conversion was studied using THEMYS STA.



EXPERIMENT

THEMYS with its TG-DTA configuration was used for the characterization of a catalyst used for the conversion of cellulose and pine into hydrogen rich gas.

The following profile was applied on the catalyst:
- Heating from 30°C to 900°C at 10°C/min
- Atmosphere: Air at 40ml/min

RESULTS AND CONCLUSION

For both tests, mass losses and exothermic effects were observed. They are related to the combustion of carbon accumulated on the catalyst. The results obtained make it possible to determine the carbon content, with values of the order of 30% by weight. The combustion temperature gives information on the structure of the coke formed during the conversion of the biomass.

Hydrogen-Rich Gas Production by Upgrading of Biomass Pyrolysis Vapors over NiBEA Catalyst: Impact of Dealumination and Preparation Method-Jacek Grams, Robert Ryczkowski, Renata Sadek, Karolina Chałupka, Kamila Przybysz, Sandra Casale, and Stanislaw Dzwigaj Energy & Fuels 2020 34 (12), 16936-16947

INSTRUMENT

THEMYS STA

ACCURATE AND SENSITIVE ULTRA-HIGH TEMPERATURE
heat flow measurement with Tri- Couple DTA technology

ULTRA-HIGH TEMPERATURE CAPABILITY
to 2400°C with a single furnace.

MODULAR ADAPTIONS ALLOWING
TGA only, DTA only, TG-DTA, and TMA up to 2400°C, DSC only and TG-DSC up to 1600°C all in one instrument

EXTERNAL COUPLING CAPABILITY
designed for evolved gas analyzers (FTIR, MS, GCMS, MSFTIR, or FTIR-GCMS)