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**Promoting hydrogen-rich syngas production from catalytic reforming of biomass pyrolysis oil on  
nanosized nickel-ceramic catalysts**

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**ABSTRACT:** Catalytic reforming of real biomass pyrolysis oil (BPO) was carried out with a nano-Ni/ceramic foam catalyst using a fixed bed reactor. XRD, TPR, SEM/EDX and BET were used to characterise the synthesized catalysts. The analysis results showed that nickel oxide was in-situ reduced to active nickel metal during the steam reforming process and the size of NiO particles loaded on the surface of ceramic foam was in the range of 30-40 nm. NiO nanoparticles showed a homogeneous multilayer deposition on the surface of the catalyst and the BET surface area of the fresh catalyst was increased with the increase of Ni loading. The effects of calcination temperature, reaction temperature and weight hourly space velocity (WHSV) on hydrogen production were studied. The results showed that the yields of hydrogen and gas were decreased with the calcination temperature increasing from 400 to 700 °C. The yield of H<sub>2</sub> were in the range of 44.41-89.17 g H<sub>2</sub> kg<sup>-1</sup> BPO when the reaction temperatures varied from 500 to 800°C. The hydrogen yield was decreased with the increase of WHSV, and a low activation energy (25.34 kJ mol<sup>-1</sup>) was obtained from kinetic studies, indicating the effectiveness of the nano-Ni/ceramic foam catalyst.

**Keywords:** Hydrogen production; Steam reforming; Biomass pyrolysis oil; Nano-NiO/ceramic foam catalyst.

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