Contribution ID: **22** Type: **Invited Oral**

# Non-thermal plasma catalytic dry reforming of methane over Ni-Co3O4 supported modified-titania catalysts: Effect of process conditions on syngas production

*Wednesday, September 20, 2023 3:20 PM (30 minutes)*

The dry reforming of methane has been studied over modified TiO2-supported 10%Ni-5%Co3O4 composite catalysts using a non-thermal plasma dielectric barrier discharge fixed-bed reactor. The 10%Ni-Co3O4/modified-TiO2 nanorods (NR) have been synthesized by hydrothermal method. Physicochemical characterizations of the composite catalysts have been conducted by X-ray diffraction (XRD), H2 temperature-programmed reduction (H2-TPR), CO2 temperature-programmed desorption (CO2-TPD), high-resolution transmission electron microscopy (HRTEM) and N2 adsorption-desorption (BET) analysis. Incorporation of cubic-structured Co3O4 into Ni/TiO2 attributes to the enhancement of basicity, reducibility and metal-support interaction. Consequently,the catalytic activity of 10%Ni-5%Co3O4/TiO2 NR increases and confer CH4 and CO2 conversions at 86.4% and 84.9%, respectively. Meanwhile, the H2 and CO selectivity are reported as 50.1% and 49.0% respectively. Higher syngas ratio (H2/CO) from 0.84 to 1.01 and 26% increment in overall energy efficiency compared to plasma DRM alone have been observed. The superior plasma DRM performance is correlated to the greater basicity properties and the synergistic effect of non-thermal plasma with the 10%Ni-5%Co3O4/modified-TiO2 catalyst composite.

## Speaker's Affiliation

Universiti Teknologi Malaysia, Johor Bahru

## Member State or IGO/NGO

Johor

**Author:** SAIDINA AMIN, Nor Aishah (Universiti Teknologi Malaysia)

**Co-authors:** Mr ABBAS, Tariq (Universiti Teknologi Malaysia); Mrs MOHIDIN, Hamdya Sabrina (Universiti Teknologi Malaysia)

**Presenter:** SAIDINA AMIN, Nor Aishah (Universiti Teknologi Malaysia)

**Session Classification:** Catalysis

**Track Classification:** Atmospheric Pressure Plasma