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### Hydrogen production and carbon nanorods formation using Ni/TiO<sub>2</sub> and Ni/Flame synthesized TiO<sub>2</sub> catalysts

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**T**hermocatalytic decomposition of methane (TCD) is one of the most advanced process, which will meet the future demand and attractive route for CO<sub>x</sub> free production of hydrogen. In this study, an attempt made using flame synthesized titanium nanorods as a catalyst support for nickel based catalyst for the hydrogen production. The comparison study between Ni/TiO<sub>2</sub> and Ni/Flame synthesized TiO<sub>2</sub> (Ni/F-TiO<sub>2</sub>) catalysts for hydrogen production using thermocatalytic decomposition of methane. The effect of nickel weight percentage (10%, 20%, 30% and 40wt %) and reaction temperature (650, 700, 750 and 800°C) with Ni/TiO<sub>2</sub> and Ni/F-TiO<sub>2</sub> catalysts were performed for hydrogen

production studies at 54sccm flow rate of methane. It was observed that at 30wt% of Ni/ TiO<sub>2</sub> and 30wt% of Ni/ F-TiO<sub>2</sub> showed the maximum hydrogen production of 48 volume% and 55 volume % at 60min of reaction time at 700°C. Before and after the reaction catalysts were characterized by the XRD, BET surface area, SEM and TEM analysis. Apart from hydrogen production carbon nanorods were observed with a diameter and length of 5-10nm and 0.25µm respectively for Ni/ TiO<sub>2</sub> and for Ni/ F-TiO<sub>2</sub> catalyst it was found to be 50-100nm and 0.5µm respectively.

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