Title : Syngas Production via Dry Reforming of Methane in a Gliding Arc Plasma Reactor Packed with NiO/ZSM-5 Catalyst

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ABSTRACT

In this special project, a plasma-catalysis system was employed for the carbon dioxide reforming of methane (dry reforming of methane) within a Gliding Arc Discharge (GAD) reactor. The study explored the effect of feed gas flow rate (25 mL/min and 100 mL/min) and the effect of NiO loading on ZSM-5 support (5%wt., 7%wt., and 10%wt.) on the production of syngas. The result indicated that the optimal performance was achieved at a feed flow rate of 25 mL/min, with using 10%wt. NiO/ZSM-5 catalyst. The conversion rates for CH_4 and CO_2 were 23.09% and 10.60%, respectively. The selectivities for H_2 and CO were 45.01% and 19.42%, respectively. The syngas yield reached at 16.84%. The specific consumed energy, E_c was 5.16×10^{-18} W·s/molecule of reactant converted, and E_s was 6.82×10^{-18} W·s/molecule of syngas produced.