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Modeling and simulation of graphene/palladium catalyst reformer for hydrogen generation from waste of IC engine

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Abstract

A small amount of hydrogen made by on-board reformer is added to the normal intake air and gasoline mixture in the vehicle's engine could improves overall combustion quality by allowing nearly twice as much air for a given amount of fuel introduced into the combustion chamber. This can be justified based on the calorific value of Hydrogen (H-2) 141.9 MJ/kg while the gasoline (C6.4H11.8) is 47MJ/kg. Different weight % of Pd and GO uses for the reformer model and has conducted simulation by COMSOL software. The best result found for the composition of catalyst (palladium 30% and graphene 70%). The study shows that reformer yield hydrogen 23% for the exhaust temperature of 600-900 degrees C and 20% for 80-90 degrees C. Pumping hydrogen may boost the fuel atomization and vaporization at engine idle condition, which could enhances the fuel combustion efficiency. Thus, this innovative technology would be able to save fuel about 12% and reduce the emission about 35%.

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