Advanced Surface Pretreatment of Metal Structured Catalyst to Improve Catalytic Performance in Steam Reforming of Natural gas for Hydrogen Production

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The conventional packed bed reactor with pellet catalysts has some barriers which are ascribed to heat and mass transfer limitation from the low effectiveness factor (η=0.03), pressure drop and channeling. Hence, the metal structured catalyst like monolith has been developed for many years which also needs to tackle the detachment and deterioration of catalyst. In this study, we have successfully developed the advanced surface pretreatment to strengthen the adherence of catalyst via the electrochemical formation of the uniform metal oxide layer on the metal substrate, which plays an important role as a binder between metal substrate and catalyst layer. The pretreatment method can be applied without regard to shape and composition of metal support. The obtained surface pretreated metal structured catalysts have been applied for the steam reforming of natural gas, showing a better catalytic activity than pellet catalysts and conventional metal structured catalyst.