

Effect of various carbon nanomaterials on catalytic conversion of STC to TCS

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Recently, silicon solar cells companies and researchers are devoted their researches for reducing the cost of polysilicon production. The recycling of byproduct silicon tetrachloride (STC) as reactant materials is an alternative way to produce trichlorosilane (TCS), which could reduce the production cost of polysilicon. In this work, a simulation study of the thermodynamic calculation using Gibb's free-energy minimization was done for the hydrodechlorination of STC to TCS. The simulation reaction conditions such as reaction temperature (700°C), pressure 1 atm with STC/H<sub>2</sub> molar ratio of 1:4.5 showed highest TCS conversion rate of ~ 15% at equilibrium. From experimental results, the activated carbon catalysts presented the higher conversion rate of 11.4% than other carbon nanomaterials of ordered mesoporous carbon (10.8%), multi-walled carbon nanotubes(11.2%), carbon black(5.63%) and graphite(2.45%).