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Catalytic performance of carbon nanotubes supported palladium catalyst for hydrogen production from hydrogen iodide decomposition in thermochemical sulfur iodine cycle

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1 Catalytic performance of carbon nanotubes supported palladium catalyst for hydrogen

2 production from hydrogen iodide decomposition in thermochemical sulfur iodine cycle

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7 Abstract

The current work presents the synthesis of carbon nanotubes supported palladium catalyst for 8 hydrogen production from hydrogen-iodide decomposition in thermochemical water-splitting 9 sulfur-iodine (SI) cycle. XRD results showed that the Pd nanoparticles were highly dispersed 10 on the CNT support. Raman results showed that Pd(3%) possessed the highest quantity of 11 defects than other loaded Pd samples and CNT support. The order of catalytic activity for 12 hydrogen-iodide decomposition is: Pd(3%)/CNT > Pd(5%)/CNT > Pd(1%)/CNT > CNT. 13 This is due to high degree of defects present in Pd(3%)/CNT as compared to others. 14 Pd(3%)/CNT also showed an excellent stability of 100 h for the reaction. The post-15 characterizations (BET, ICP-AES, XRD and TEM) of spent-Pd(3%)/CNT after 100 h were 16 carried out in order to find out the changes in the specific surface area, elemental analysis, 17 structure and particle size. No changes were observed in the specific surface area, elemental 18 19 analysis, particle size, and structure of the spent catalyst as compared to the fresh one. This shows the Pd/CNT has a lot of potential of generating hydrogen in the thermochemical SI 20 cycle. 21

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