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Enhanced Photocatalytic Hydrogen Production on TiO2 by Using Carbon Materials

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Abstract : The effect of carbon materials on TiO2 for the photocatalytic hydrogen gas production from water/alcohol mixtures was investigated. Single walled carbon nanotubes (SWNTs), multi walled carbon nanotubes (MWNTs), carbon nanofiber (CNF), fullerene (FLN), graphite (GP), and graphite silica (GS) were used as co-catalysts by directly mixing with TiO2. Drastic synergy effects were found with increase in the amount of hydrogen gas by a factor of ca. 150 and 100 for SWNTs and GS with TiO2, repectively. The order of H2 gas production for these carbon materials was SWNTs > GS >> MWNTs > FLN > CNF > GP. To maximize the hydrogen production from SWNTs/TiO2, various parameters of experimental conditions were changed. Also, a comparison between Pt/TiO2, WNTs/TiO2 and GS/TiO2 was made for the amount of H2 gas production. Finally, the recyclability of SWNTs/TiO2 and GS/TiO2 were tested.

Keywords : photocatalysis, carbon materials, alcohol reforming, hydrogen production, titanium oxide
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