A study on the influence of chemical oxidation on Pt containing graphitic carbon nitride photocatalysts in Photocatalytic Hydrogen production

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In this study, we prepared Pt-containing graphitic carbon nitride (g-C_3N_4) catalysts modified by a simple chemical oxidation of g-C_3N_4 and applied them for photocatalytic hydrogen evolution tests for the first time. The hydrogen production rates of the chemically oxidative Pt/g-C_3N_4 photocatalysts were at least five times as high as those of the bulk Pt/g-C_3N_4. The chemical oxidation of g-C_3N_4 introduced the oxygen-containing functional groups on the tri-s-triazine units, resulting in more negatively charged surface of g-C_3N_4. During the Pt photodeposition on the g-C_3N_4 surface, the chemically oxidative g-C_3N_4 with more negatively charged surface and the functional groups not only promoted the agglomeration of Pt nanoparticles on the g-C_3N_4 surface but also maintained the high ratio of Pt^{2+}/Pt^0 for the Pt nanoparticles, which enhanced the hydrogen evolution rate by suppressing the reversible reaction route of H_2 to $2H^+$. In addition, the presence of the oxygen-containing functional groups on the chemically oxidative g-C_3N_4 increased the separation efficiency of photo-excited charges over Pt/g-C_3N_4.