A study on the influence of platinum loading methods on oxidized graphitic carbon nitride photocatalysts in photocatalytic hydrogen evolution reaction

Nguyen Phuong Anh, Dao Duc Quang, 웬티킴안, 왕명연, 김상윤, 신은우†
울산대학교
(ewshin@ulsan.ac.kr†)

In this study, we prepared chemically oxidized Pt-containing graphitic carbon nitride (g-C3N4) catalysts by different Pt loading methods and applied them for photocatalytic hydrogen evolution tests. The hydrogen production rate of the chemically oxidized Pt/g-C3N4 photocatalysts prepared by hydrogen reduction (1152.8 μmol/g.h) was highest in comparison with those prepared by chemical reduction (409.9 μmol/g.h) and photodeposition (583.7 μmol/g.h). The different essences of reduction agents in the decoration of Pt on chemically oxidized g-C3N4 can bring about the difference in Pt/g-C3N4 catalysts' properties, such as contents of oxygen-containing functional groups, the separation efficiency of photo-excited charges over Pt/g-C3N4, distribution of Pt nanoparticles on the g-C3N4 surface, and valences of Pt co-catalyst. The higher portion of the Pt2+ distribution of Pt particles enhanced the hydrogen evolution rate by suppressing the reversible reaction route of H2 to 2H+ and provided plentiful active sites for H2 evolution reaction.