H_2 production under visible light irradiation from aqueous methanol solution on $CaTiO_3$:Cu

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The hydrogen production by using photocatalyst and solar energy from photocatalytic water splitting has been attractive, because it is a sustainable process, unlike hydrogen production from fossil fuels. A CaTiO3, one of the perovskite type materials, is well-known photocatalyst, but it can work under UV irradiation due to its large bandgap (3.5eV). It leads to low conversion efficiency of solar energy because UV light is only 4% in solar energy spectrum. Recently, there are many reports that the metal doping into UV-light-responsive photocatalyst is a promising method to transform to visible-light-responsive photocatalyst.

In this work, the Cu doped CaTiO3 is prepared by spray pyrolysis from aqueous and polymeric precursor solutions. The hydrogen evolution rate of CaTiO3:Cu is enhanced with the increase of Cu loading, while the increase of doping concentration above 1.0 mol% leads to a decrease of hydrogen evolution rate under visible light. In case of the photocatalyst prepared by spray pyrolysis from polymeric precursor, hydrogen evolution rate was increased by 2.5 times compared with that of sample prepared from aqueous precursor solution.