ルチル酸化チタンと鉄シリサイドが接合した光触媒複合粉末への水素発生助触媒担持の検討

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Loading the hydrogen evolution cocatalysts onto the overall water-splitting reaction photocatalyst gold-inserted iron disilicide and rutile titanium dioxide heterojunction

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Photocatalytic water-splitting is an ideal method for solar energy harvesting. Some photocatalysts that can split water under UV light have been discovered. However, development of visible-light sensitive photocatalysts is indispensable due to the effective utilization of incoming solar energy. On the other hand, semiconducting iron disilicide (β-$FeSi_2$) has a band gap of approximately 0.80 eV. Moreover, it has recently been reported that this semiconducting material acts as a hydrogen evolution photocatalyst [1]. As a hydrogen-evolution photocatalyst, β-$FeSi_2$ is expected to enable the use of infrared light longer than 1300nm, which is the longest wavelength of light to be utilized. In this paper, we report the effects of the reduction co-catalyst on water-splitting properties for β-$FeSi_2$ and rutile TiO_2 composite powder.

Keywords : Iron disilicide; Composite Powder; Photocatalysis

鉄シリサイド（β-$FeSi_2$）のもつ化学ポテンシャルにおいて、その伝導帯の対水素標準電極電位は-0.7V と水からの水素発生電位よりも卑な電位側に位置しており。水からの水素発生が期待される。我々はこれまでに炭化ケイ素（SiC）、及びルチル型酸化チタン（TiO_2）を酸素発生光触媒としてその表面にβ-$FeSi_2$ ナノ結晶粒を合成した複合粒子を作製し、光触媒効果による水分解からの酸素・水素発生を報告した [図 1]。

本発表ではβ-$FeSi_2$ / TiO_2 複合粉末に還元反応助触媒（Pt）、及び Cr 被覆層を担持しその光触媒効果による水分解反応の効果を報告する。

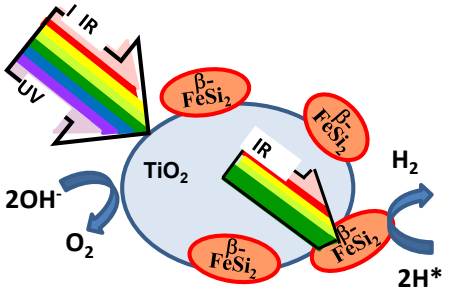

Fig.1. Schematic diagram of β-$FeSi_2$ / TiO_2 composite powder.

1) M. Yoshimizu, R. Kobayashi, M. Saegusa, T. Takashima, H. Funakubo, K. Akiyama, Y. Matsumoto and H. Irie, Chem. Comm., 51 (2015) 2818..