鉄シリサイド／ルチル型酸化チタン複合粒子の光触媒効果による水分解

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Synthesis and Photocatalytic Properties of Iron Disilicide/TiO_2 Composite Powder

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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 and a very large optical absorption coefficient over 1×10^5 /cm at 1 eV. Moreover, it has recently been reported that this semiconducting material acts as a hydrogen evolution photocatalyst. 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 on the novel fabrication method of β-$FeSi_2$ and rutile TiO_2 composite powder.

Keywords : Iron disilicide; Composite Powder; Photocatalysis

β-$FeSi_2$ は水素発生光触媒材料として報告されているが、バンドギャップが 0.8eV と小さいため単一粒子での水分解は困難である [1)]。このため報告者は SiC 粒子表面に β-$FeSi_2$ ナノ結晶粒を合成した複合粒子を作製し、酸化犠牲剤のホルムアルデヒドを添加した水溶液中での光触媒効果による水素発生を報告した [2)]。本研究ではスパッタ法を用いてルチル型酸化チタン（TiO_2）表面に β-$FeSi_2$ ナノ結晶粒が分散した複合粒子 (図 1) を作製し、この複合粒子を純水中で紫外光及びキセノン光照射により水素、及び酸素の発生を確認した。

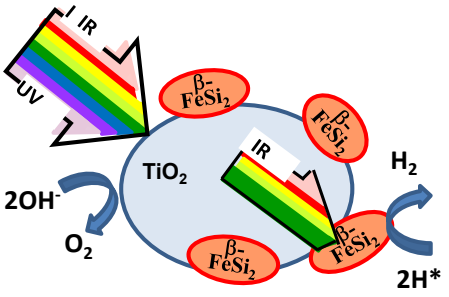

Fig.1. Schematic diagram of β-$FeSi_2$ / TiO_2 composite powder.

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