

Ag_3VO_4 -CdS Z-scheme system for photocatalytic water splitting

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Photocatalytic water splitting commonly uses single semiconductor to evolve hydrogen, which the suitable band gap is a challenge to be matched. Photocatalytic water splitting produces hydrogen that can be used as energy. Photocatalyst is semiconductor which can split the water with the help of light energy. The process can be conducted in two methods: one photon process and two-photon process (z-scheme).

Semiconductors have a band structure in which the conduction band is separated from valence band by a band gap in a certain width. By the existence of light, water molecules are reduced to form hydrogen and are oxidized to form oxygen for overall water splitting process. To find the semiconductor with suitable band gap is considered very challenging. Therefore, two-photon process is preferred because the combination of two semiconductors uses transfer electron process to exhibit reduction by combining two band gap's positions.

Z-scheme is a combined system that follows similarity of photosynthesis scheme in plants. Z-scheme system in this research consists of Ag_3VO_4 -CdS photocatalyst couple. This system combines two photocatalysts which possess reduction and oxidation ability.

The photocatalyst samples were made by using solid state reaction method. Xe lamp was used as light source in photocatalytic water splitting process. XRD, SEM, and TEM analyses were done to reveal photocatalyst characteristics