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Synthesis and Characterization of Attapulgite Clay Coated Ag/AgBr/TiO₂ Visible Light Photocatalyst

Journal [Advanced Materials Research](#) (Volume 178)

Volume [Advance in Ecological Environment Functional Materials and Ion Industry II](#)

Edited by Jinsheng Liang and Lijuan Wang

Pages 285-290

DOI 10.4028/www.scientific.net/AMR.178.285

Citation Xu Gu et al., 2010, Advanced Materials Research, 178, 285

Online since December, 2010

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Keywords [Ag/AgBr/TiO₂](#), [Attapulgite Clay](#), [Photocatalytic](#)

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Advanced Materials Research Vol. 178 (2011) pp 285-290
Online available since 2010/Dec/30 at www.scientific.net
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doi:10.4028/www.scientific.net/AMR.178.285

Synthesis and Characterization of Attapulgite Clay Coated Ag/AgBr/TiO₂ Visible Light Photocatalyst

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Keyword: attapulgite clay, Ag/AgBr/TiO₂, photocatalyst

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1. Introduction

TiO₂ photocatalysis has been attracted wide attention for the degradation of different pollutants and the destruction of bacteria [1]. However, the main drawback of low quantum yield and the lack of visible light utilization hinder its practical application. To solve these problems, many methods were used to enhance the photocatalytic efficiency and visible-light utilization of TiO₂, which include impurity doping [2-4], metallization [5,6], and sensitization [7]. Ag/AgBr/TiO₂ photocatalyst prepared by coating AgBr on the P-25 TiO₂ exhibits excellent visible-light photocatalytic activity for the destruction of azodyes and bacteria [8]. To save expensive raw materials, photocatalyst were usually loaded on the surface of porous supports. Those supported photocatalysts remain high photocatalytic efficiency for the high dispersion of catalyst particles and high adsorption properties of the supports. So, Elahifard et al [9] prepared apatite coated Ag/AgBr/TiO₂ visible light photocatalyst through the deposition of TiO₂ on hydroxyapatite, followed by the decoration of AgBr, which also has a significantly high photocatalytic activity under visible light. In these photocatalysts [8, 9], AgBr is the visible light component of the photocatalyst and Ag⁰ prepared on the surface of AgBr under visible light enhance the electron-hole separation and interfacial charge transfer.

Attapulgite (ATP, or palygorskite) clay is an cheap natural clay and has been used to remove organic pollutants in water for their excellent adsorption properties [10, 11]. There has been reported that Ag-PG/TiO₂ photocatalyst prepared by coating TiO₂ nanoparticles on the surface of palygorskite clay modified by silver ions has high degradation efficiency for methylene blue under UV light [12]. Zhang et al [13] prepared attapulgite-SnO₂-TiO₂ composite photocatalyst after deposition and calcination of SnO₂ and TiO₂ precursors, which exhibits high photocatalytic activity for degradation of methyl orange under ultraviolet radiation.

In this paper, we prepared Ag/AgBr/TiO₂/ATP composite photocatalyst after deposition TiO₂ and

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