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Abstract:

To explore the effect of pH on the photocatalytic oxidation activities of BiOCl catalysts, the BiOCl catalysts under different pH values were prepared via a facile hydrothermal method. The as-prepared catalysts were characterized by BET, XRD,HRSEM,SEM and UV-vis to find out the impact of pH values. Photocatalytic ability of BiOCl catalysts were evaluated by oxidation of gaseous elemental mercury under UV light irradiation. It was found that BiOCl catalysts prepared under alkaline condition exhibited the best photocatalytic oxidation activities. The difference of photocatalytic activity among the as-prepared catalysts can be attribute to the growth orientation of the crystal BiOCl catalyst and the adsorption capacity of elemental mercury.

Keywords： BiOCl catalyst; photocatalysis; elemental mercury; pH value

1. Introduction

Mercury has the characteristics of toxicity and persistent bioaccumulation in the environment, which is threat to human health. One of the major anthropogenic source is coal -fired flue gas from the power plant emission. There are three forms of mercury in the coal-fired flue gas: elemental mercury(Hg^0), oxidized Hg(Hg^{2+}) and particulate Hg(Hg_p).[1,2] Hg^{2+} can be removed by wet scrubbers, whereas electrostatic precipitator (ESP) or fabric filter (FF) can easily remove Hg_P. The removal efficiency of Hg_P and Hg^{2+} can reach up to 90%. However, due to the volatility, insolubility and chemical stability, Hg^0 is difficult to remove.[3]

Bismuth oxychloride is of lower valence band energy, so it has strong oxidation ability. Furthermore, bismuth oxychloride has been taken more and more attention beause of its layered structure. Its layered structure feature may promote its photocatalytic performance due to self-built internal static electric fields, which can enhance effective separation of the photoinduced electron-hole pairs.[4-5] Electron-hole pairs are the important factors for photocatalytic oxidation on elemental mercury, which has been reported in our previous research[6]. The Cl 2p, O2p and Bi6s

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