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Preparation and characterization of ultrafine Fe-O compound /ammonium perchlorate nanocomposites via in-suit growth method

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Abstract: In this paper, the ultrafine Fe-O compound/ammonium perchlorate (AP) nanocomposites were prepared via in-suit growth method. The structure and morphology of the nanocomposites were characterized by infrared spectra, X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersion X-ray spectrometer (EDS) and transmission electron microscopy (TEM) test. The results showed that the prepared Fe-O compound nanoparticles were amorphous state and deduced as 2L-ferrihydrate. The size of Fe-O compound/AP nanocomposites could be effectively controlled by changing the recrystallization condition. 2L-ferrihydrate nanoparticles was evenly dispersed in the nanocomposites proved by EDS and TEM analysis. Furthermore, the thermal decomposition of Fe-O compound/AP nanocomposites was analyzed by TG-DSC method. The prepared 2L-ferrihydrate nanoparticles of the nanocomposites showed good catalytic effect on AP because of their decreasing the decomposition temperature and increasing the total heat release of AP.

Keywords: Preparation, Catalysis, Ammonium Perchlorate, Nanocomposite materials

1. Introduction

Composite solid propellants were extensively used in gas generators for airbags, tactical missiles, propulsion for space vehicles and attitude control systems owing to their good energy performances, mechanical properties and storage properties [1-4]. Ammonium perchlorate (AP) was a major oxidizer of composite solid propellant,

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