Electrophoretic Deposition of Al/CuO Energetic Materials and Their Heat Release Performance

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In this study, Al/CuO energetic materials with high exothermic properties were prepared by electrophoretic deposition of nano-Al and CuO microboxes on Ti sheets. The microstructure and phase composition of Al/CuO energetic materials were characterized by scanning electron microscopy (SEM) and X-ray diffraction (XRD). The electrophoretic deposition behavior of nano-Al and CuO microboxes were systematically investigated, and the electrophoretic deposition process was controlled by diffusion. The differential scanning calorimetry results showed that the maximum heat released by Al/CuO energetic material is 3049 J/g at an equivalent ratio of 3.0. The combustion properties of Al/CuO energetic materials were tested by optical fiber spectra. When the equivalence ratio was 2.25, the intensity of the spectra of Al/CuO energetic materials were the strongest and the lowest color temperature was 2916 K. This work provides a reference for the preparation of highly exothermic Al/CuO energetic materials by electrophoretic deposition.

Keywords: Al/CuO; Energetic materials; Heat release; Electrophoretic deposition.

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