

Thermal Characteristics of the Core-Shell Structured $\text{Cr}_2\text{O}_3/\text{NH}_4\text{ClO}_4$ Composites

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Ammonium perchlorate(NH_4ClO_4) has been a important oxidizer of the solid composite propellants and the pyrotechnics. Commercial solid composite propellant was mainly composed of the polymer binder (frequently HTPB), fuel (Mg, Al, B), oxidizer (NH_4ClO_4), and other ingredients, such as secondary explosives. Aside from the chemical energy of the ammonium perchlorate and the energetic polymers, burning characteristics of the propellant formulations could be easily modified by either the addition of the combustion catalysts or the homogeneity control of the mixtures. In this work, the chromium oxide was selected as a combustion catalyst in order to tune the thermal decomposition of the ammonium perchlorate. Organic solvent saturated with the ammonium perchlorate was injected into the anti-solvent containing the chromium oxide particles. The chromium oxide particles were encapsulated with the ammonium perchlorate precipitated from the mixture of the solvent and the antisolvent. EDS (energy dispersive spectroscopy) and TGA and DTA were employed to characterize the core-shell particles.