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Thermal Decomposition of Ammonium Perchlorate in the Presence of Ferric Oxide and Graphene Oxide Nonmaterial's

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Abstract : The addition of combustion catalysts to ammonium perchlorate-based composite fuels can indeed significantly enhance their performance. In this work, a nanocomposite was synthesized using graphene oxide (GO) and hematite nanoparticles grafted onto graphene oxide as a catalyst support.To characterize the nanocomposite, several experimental techniques were employed, including Fourier-transform infrared spectroscopy (FTIR), Raman spectroscopy, and scanning electron microscopy (SEM). FTIR is useful for analyzing chemical bonding and functional groups, while Raman spectroscopy provides information about the vibrational modes of the materials. SEM allows for visualizing the surface morphology and structure.The thermal analysis of two mixtures, one based on AP/GO and the other on AP/GO-Fe2O3, was conducted with varying percentages. The results indicated that the nanocomposite GO-Fe2O3 acted as a catalyst, significantly accelerating the thermal decomposition process of AP. This catalytic effect ultimately led to an improvement in the energy performance of the composite fuel.Overall, the synthesis and characterization of the nanocomposite, as well as the thermal analysis, demonstrated the effectiveness of GO-Fe2O3 as a combustion catalyst in enhancing the performance of ammonium perchlorate-based composite fuels.

Keywords : composite propellants, ammonium perchlorate, nanocomposite, catalytic support, hematite nanoparticles, graphene oxide, thermal decomposition
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