

Thermal Behavior and Mechanical Property of GAP-base Energetic Thermoplastic Elastomer Modified Single-base Propellant

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Abstract: In order to improve the mechanical property of single-base propellant, the single perforation cylinder modified single-base propellant containing glycidyl azide polymer (GAP)-base energetic thermoplastic elastomer were prepared. The thermal stability was evaluated by methyl violet method and vacuum stability test. The thermal decomposition process of the sample was investigated by using differential scanning calorimetry method (DSC). The impact and compression properties of the sample were studied. The results show that when increasing the content of GAP-ETPE, the thermal stability of the modified single-base propellant improve, the exothermic peak temperature, enthalpy of thermal decomposition and density gradually decrease; the impact strength and compression ratio of modified single-base propellant sample under the temperature of $-40\text{ }^{\circ}\text{C}$, $20\text{ }^{\circ}\text{C}$ and $50\text{ }^{\circ}\text{C}$ all gradually increases, while the compressive strength decreases. Compared with the blank sample, the impact strength of the sample containing 30% of GAP-ETPE at low temperatures, room temperature and high temperature increases by 161.4%, 160.1% and 164.0%, respectively; compressive strength decreases by 23.6%, 28.8% and 33.1%, respectively; compression ratio increases by 246.4%, 233.9% and 266.0%, respectively.

Key words: GAP-ETPE; modified single-base propellant; thermal stability; thermal decomposition; mechanical property

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为了丰富学术交流形式,及时传递含能材料领域同行们的学术观点和思想,《含能材料》开设了“观点”栏目。“观点”栏目的来稿应观点鲜明、内容新颖、形式上短小精悍。欢迎含能材料各领域的专家积极来稿。来稿时请附个人简介及主要研究工作经历。

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