

Influence of Fluoride Functional Additives on the Combustion Performance of Gun Propellant

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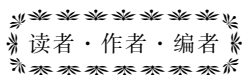
Abstract: To improve the salt/wet prevention and high temperature resistant performance of propellant surface and adjust its combustion performance at the same time, TiO_2 -fluorinated acrylate functional additives were synthesized via reaction of titanium dioxide nanoparticle and fluoride monomer. Gun propellant particles were prepared by blending functional additives and triethylene glycol dinitrate (TEGDN) double-base propellant pills and the experiment of the gun propellant was performed by a closed bomb. The influence of fluorinated functional additive content, fluorine content and particle size on the constant volume combustion performance of the gun propellant was studied. Results show that with decreasing the 12F functional additive content, the burning rate of the gun propellant reveals a trend of increase. 12F functional additives make the burning rate of gun propellants increase by $0.1\text{--}0.3\text{ cm} \cdot \text{s}^{-1}$, 3F functional additives make the burning rate of gun propellants reduce by $0.4\text{--}1.0\text{ cm} \cdot \text{s}^{-1}$. Under this experimental condition, the influence of particle size is not obvious on the combustion performance of propellant. To better control the burning rate of gun propellant, the proportion of fluoride and TiO_2 content in the chain segment of functional additives and the physical form of aggregation of gun propellant should be considered comprehensively.

Keywords: fluoride functional additives; combustion performance; gun propellant; surface enrichment; closed bomb test

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第 18 届国际含能材料发展新趋势研讨会会议报道

第 18 届国际含能材料发展新趋势研讨会 (Proceedings of the 18th Seminar on New Trends in Research of Energetic Materials) 于 2015 年 4 月 15 ~ 17 日在捷克帕尔杜比采召开, 主题是含能材料研究新方法。来自美国、德国、英国、中国、俄罗斯、以色列、土耳其、法国、比利时、瑞典、捷克、波兰等国家的数百位专家学者和青年研究人员参加了会议, 其中包括美国洛斯阿拉莫斯国家实验室、德国 ICT 研究所、英国卡文迪许实验室、俄罗斯科学院有机化学研究所等国际著名研究机构的含能材料专家。会议共有 3 个特邀报告和 35 个大会报告, 特邀报告分别介绍了 HNF 和 ADN 特殊的稳定性及热分解特性、含能材料特性评估和氧化炸药的安全处理等相关内容, 大会报告涉及含能材料合成与表征、热分解、晶体学、复合材料、性能模拟计算和预测等。

会议主办单位捷克帕尔杜比采大学含能材料研究所是专门从事含能材料研究的机构, 每年 4 月定期举办含能材料发展新趋势的系列会议。

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