Effect of Short Carbon Fibers on Mechanical Properties of AP/HTPB Base Bleed Propellant

LIU Zhi-lin, YAO Wen-jin, WANG Xiao-ming, LI Wen-bin, GAO Xiang
(*Ministerial Key Laboratory of ZNDY, NUST, Nanjing* 210094, *China*)

Abstract: To improve the mechanical properties of ammonium perchlorate(AP)/ hydroyl-terminated polybutadiene(HTPB) base bleed propellants, the 2 mm short carbon fibers of mass fraction as 0.3% and 0.5% respectively were added in the original AP/HTPB base bleed propellant formulation. The static uniaxial compression and tensile tests for AP/HTPB base bleed propellants containing short carbon fibers were conducted. The microscopic analysis of fracture surface for specimens was performed by SEM. Experimental results show that the tensile strength of AP/HTPB base bleed propellants of adding 2 mm short carbon fibers of mass fraction as 0.3% and 0.5% increases by 11.7% and 33.0% respectively and their compression strength increases by 2.1% and 7.8% respectively. The short carbon fibers are distributed in the HTPB matrix. The bonding property between short carbon fibers and HTPB matrix is good. The damage of new AP/HTPB base bleed propellants containing short carbon fibers is mainly caused by debonding of the AP particles. The short carbon fibers in AP/HTPB base bleed propellants have an inhibitory effect on microcrack development, which demonstrates the short carbon fiber is a good reinforcement material for AP/HTPB base bleed propellants.

Key words: AP/HTPB base bleed propellant; short carbon fibers; mechanical property; SEM analysis; dewetting
CLC number: TJ55; O34 **Document code**: A **DOI**: 10.11943/j.issn.1006-9941.2017.05.003

读者·作者·编者

《含能材料》“观点”征稿

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介绍。

《含能材料》编辑部