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ZHANG Yujuan,WANG Zhaoba,YANG Yajun.Liner's Semi-cured State Determination ofSolid Rocket Propellant Based on Infrared Technology[J].,2012,6:103-105.

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基于红外光谱的固体火箭推进剂包覆层半固

《弹箭与制导学报》[ISSN:1673-9728/CN:61-1234/TJ] 期数: 2012年第6期 页码: 103-105 栏目: 火箭技术 出版日期: 2012-12-25

Title: Liner's Semi-cured State Determination ofSolid Rocket Propellant Based on Infrared Technology

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关键词: 红外光谱; 半固化; EMD; 包覆层

Keywords: infrared spectra; semi-cured state; EMD; liner

分类号: V435

DOI: -

文献标识码: A

摘要: 文中以固体火箭推进剂包覆层材料——端羟基聚丁二烯(HTPB)为研究对象,试图得到判定其半固化状态的方法。首先,用红外光谱仪获取包覆层不同固化时间的红外谱图; 然后用经验模态分解方法(EMD)结合阈值处理对光谱进行数据处理; 最后选取谱图中合适的特征基团与参比基团,分析其透光率比值在包覆层固化过程中的变化规律,得出实验结果。结果表明固化温度为20℃时,透过率比1.42～1.54为半固化状态,固化温度为60℃时,透过率比2.32～2.41为半固化状态。

Abstract: In this paper, a method was proposed to characterize liner's semi-cured state of solid propellant rocket engine. Firstly, spectra were got by FTIR. Secondly, empirical mode decomposition and threshold processing were applied to denoise spectra. Thirdly, proper characteristic group and reference group were selected, then results were got by calculating the light-transmission coefficient changing discipline of characteristic group and reference group in liner curing process. The results display that this method can distinguish liner's semi-cured state effectively, the liner is semi-cured when the light-transmission coefficient is 1.42～

1.54 at cure temperature of 20℃, but it is semi-cured when coefficient is 2.32～2.41 at cure temperature of 60℃.

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