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Title: Process Properties and Mechanical Properties of HTPB Propellant with Micron Scale AP

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Keywords: physical chemistry; micron scale AP; process properties; mechanical properties; HTPB propellant; apparent viscosity; particle gradation

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摘要: 制备了含微米级AP(质量分数大于50%)的HTPB推进剂药浆和标准试件,利用流变仪测试了+20℃和-40℃时药浆的表现黏度,用材料试验机测试了标准试件的力学性能,讨论了增塑比、AP粒度级配、键合剂等对HTPB推进剂工艺性能和力学性能的影响。结果表明,当增塑比为0.42、AP粒度级配采用25%的120μm AP、30%的6~8μm AP和20%的1μm AP时,推进剂样品6h的表现黏度为1267Pa·s,低温延伸率达到38%。

Abstract: The HTPB propellant slurry and standard specimen with micron scale AP of more than 50% in mass fraction were prepared. The mechanical properties and apparent viscosities at +20°C and -40°C of the propellant sample were measured using a material testing machine and a rheometer. The effects of plasticizing ratio, AP particle gradation and bonding agent etc. on the process properties and mechanical properties of HTPB propellant with micron scale AP were discussed. Results show that when plasticizing ratio is 0.42, and 120μm AP with mass fraction of 25%, 6-8μm AP with mass fraction of 30% and 1μm AP with mass fraction of 20% are adopted for AP particle gradation, the value of apparent viscosity of the propellant sample is 1267Pa·s at 6h, and the low temperature elongation reaches to 38%.

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