

激光与光电子技术应用

含能材料激光诱导起爆特征波长解析

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摘要: 为了解激光波长对炸药起爆感度影响,降低炸药激光起爆能量,通过炸药光谱、分解机理和量子化学计算,分析了常用PETN,RDX,HMX和HNS炸药的化学弱键和激光敏感波长。结果表明,PETN,RDX,HMX和HNS中最弱化学键均是硝基键—NO₂,其对应的共振耦合作用激光波长均在6300nm左右;引起4种炸药电子跃迁激发的激光波长在190nm~250nm之间。在这些特征波长激光作用下,能够降低炸药的起爆能量。

关键词: 激光技术 激光诱导起爆 光谱分析 特征波长 含能材料

Characteristic wavelength analysis for laser-induced initiation in energetic material

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Abstract: In order to reduce the laser initiation energy and understand effect of laser wavelength on initiation sensitivity of explosives, the weak chemical bond and sensitive laser wavelength of PETN, RDX, HMX and HNS explosives were analyzed through spectrum, thermal decomposition mechanism and quantum mechanics calculation. Results show that the weakest chemical bond of PETN, RDX, HMX and HNS are nitryl whose correspondent resonant coupling laser wavelength is around 6300nm, and the laser wavelength inducing electronic transition of PETN, RDX, HMX and HNS explosives is among 190nm~250nm. Under the action of laser at these characteristic wavelengths, laser initiation energy of explosives can be decreased.

Keywords: laser technique laser-induced initiation spectrum analysis characteristic wavelength energetic material

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