Transformation of Hexanitrohexaazaisowurtzitane (HNIW) Investigated by in-situ X-ray powder diffraction[J]. *Central European Journal of Energetic Materials*, 2016, 13(4): 1023-1037.
[26] Pu L, Xu J, Sun J, et al. Investigation on the Thermal Expansion of Four Polymorphs of Crystalline CL-20[J]. *Journal of Energetic Materials*, 2015, 34(2): 205-215.
[27] 张贵锋, 黄昊. 固态相变原理及应用[M]. 北京: 冶金工业出版社, 2011: 1-24.
ZHANG Gui-feng, HUANG Hao. Principle and application of solid phase transformation[M]. Beijing: Metallurgical Industry Press, 2011: 1-24.
[28] Vittal J J, Hong S Q. Engineering solid state structural transformations of metalcomplexes[J]. *Coordination Chemistry Reviews*, 2017, 342(13): 1-18.
[29] Black J F B, Cardew P T, Cruz-Cabeza A J, et al. Crystal nucleation and growth in a polymorphic system: Ostwald's rule, p-aminobenzoic acid and nucleation transition states[J]. *Cryst Eng Comm*, 2018, 20(6): 768-776.

Influence and Action Mechanism of Additives on Heat-induced Polymorphic Transformation of HNIW

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Abstract: Aiming at the problem of leading to explosive structure damage, performance reduction and safety descending due to the polymorphic transformation of hexanitrohexaazaisowurtzitane (HNIW) was easily occurred in complex environment, the effects of additives on the heat-induced polymorphic transformation (PT) behavior of ε-HNIW in composite explosives were studied by the in-situ X-ray powder diffraction (in-situ XRD) technology. The change rule of heat-induced PT rate of HNIW in composite explosives with temperature were calculated and obtained by means of in-situ XRD non-standard quantitative phase analysis. The heat-induced PT characteristic parameters and PT rules of HNIW in composite explosives were analyzed and obtained. It was proposed to divide the additive into three species, including promote PT system, intermediate PT system and suppress PT system. Results show that the additives used in promote PT system have the tittle dissolution on HNIW, the interface micro-dissolution layers were formed on the HNIW crystal surfaces, which makes the heat-induced PT route change from solid-solid PT to solid-solution-solid PT and reduces the PT activity barrier energy, thus the heat-induced PT of $\varepsilon \rightarrow \gamma$ is obviously promoted. The additives used in the suppress and intermediate PT system have strong coating effect on the HNIW crystals. The preliminary heat-induced PT temperature is improved through altering the thermal transfer mode and surface heat insulation, and the inhibition effect on the heat-induced PT of HNIW is realized to a certain extent.

Key words: hexanitrohexaazaisowurtzitane (HNIW, CL-20); additives; in-situ X-ray powder diffraction (in-situ XRD); heat-induced polymorphic transformation; induced mechanism
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