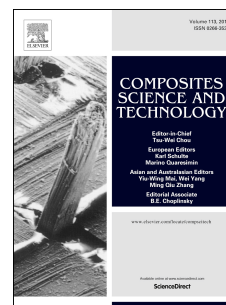


Accepted Manuscript

Self-healing improves the stability and safety of polymer bonded explosives

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PII: S0266-3538(18)30789-9

DOI: [10.1016/j.compscitech.2018.08.025](https://doi.org/10.1016/j.compscitech.2018.08.025)

Reference: CSTE 7358

To appear in: *Composites Science and Technology*

Received Date: 3 April 2018

Revised Date: 13 July 2018

Accepted Date: 18 August 2018

Please cite this article as: Huang X, Huang Z, Lai J-C, Li L, Yang G-C, Li C-H, Self-healing improves the stability and safety of polymer bonded explosives, *Composites Science and Technology* (2018), doi: 10.1016/j.compscitech.2018.08.025.

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Title : Self-healing Improves the Stability and Safety of Polymer Bonded Explosives

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† Electronic Supplementary Information (ESI) available.

Keywords: self-healing; polymer bonded explosives; fluoropolymer; ionic liquid; composites

Abstract:

Polymer-bonded explosives (PBXs) are often subjected to different external environmental conditions with various temperature and humidity during long-term storage, transportation, and usage process. The change in temperature and humidity will result in PBXs cracks formation and cause higher risk of explosion evolution when undergoing various stimulus including impact or friction. Herein, a self-healing polymer binder is developed to solve this problem. The fluoropolymer gel binder, a PVDF-co-HFP (copolymer of CH₂-CF₂ and CF₂-CF(CF₃))/EMIOTf (1-ethyl-3-methylimidazolium trifluoromethanesulfonate)/graphene ternary composite, has high density, high thermal conductivity, excellent interfacial adhesion property, and exhibits self-healing ability at room temperature. Highly filled PBXs composites with 95 % of explosive 2, 6-diamino-3, 5-dinitropyrazine-1-oxide (LLM-105) and 5 % of ternary composite are fabricated. The as-prepared PBX samples have high denotation parameter (7800 m s⁻¹), low impact sensitivities (11-12 J), and low friction sensitivity (no sparks was observed even at friction

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