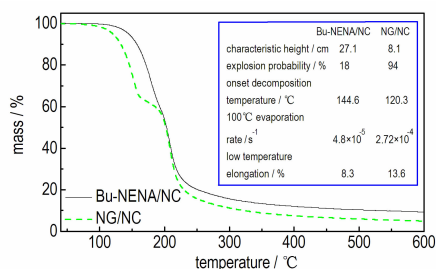


### Characterization of Bu-NENA/NC Low Sensitive Double-base Propellant

ZHAO Ben-bo, XIA Min, HUANG Jia-qi, LI Wei, LIU Qiang, LUO Yun-jun

*Chinese Journal of Energetic Materials*, 2017, 25(10): 794–798

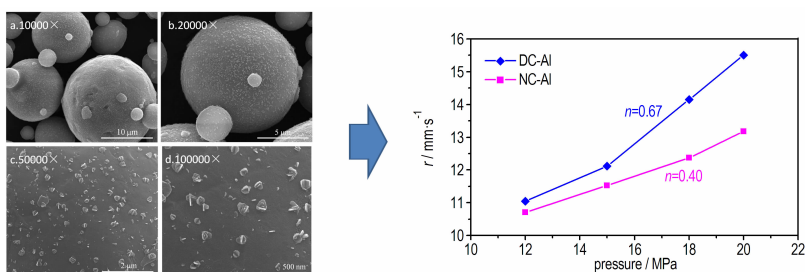


Bu-NENA ( *N*-butyl-*N*-nitrateethylnitramine ) / NC ( nitrocellulose ) double-base propellant was formulated with Bu-NENA as a replacement for NG ( nitroglycerin ) and the NG/NC propellant was also prepared as a control. The sensitivity, evaporation, thermal decomposition and mechanical properties of the double-base propellants were investigated.

### Effect of Aluminum Morphology on Burning Rate Characteristics of HTPB Propellant

ZHU Li-xun, LIANG Bei, LIU Jin-xiang, ZHANG Wei-hai, YAN Wu-qi, LIAO Xin

*Chinese Journal of Energetic Materials*, 2017, 25(10): 799–803

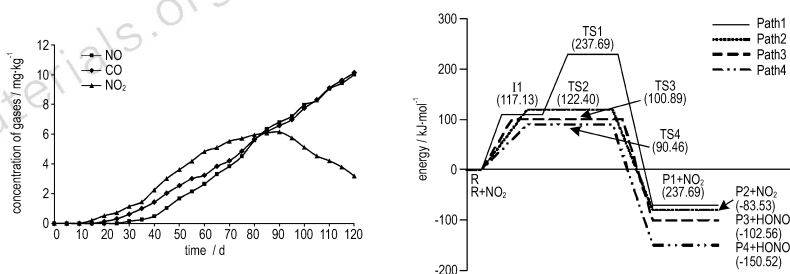


To investigate the effect of aluminum (Al) powder with different surface morphology on the burning rate of hydroxyl-terminated polybutadiene (HTPB) propellant, based on the formulation of HTPB four component propellant, the morphologies of two kinds of Al (5–10 μm) powder were observed by scanning electron microscopy (SEM) and laser particle size distribution instrument, and the burning rate of HTPB propellant with different Al powders was measured by underwater acoustic emission method, and the pressure exponent was also calculated.

### Decomposition Mechanism of Nitroglycerin During Storage

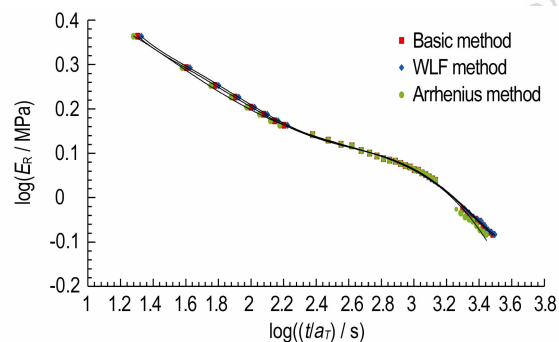
PEI Li-guan, DONG Ke-hai, TANG Yan-hui, ZHANG Bo, YU Chang, LI Wen-zuo

*Chinese Journal of Energetic Materials*, 2017, 25(10): 804–809



To get the detailed chemical kinetic mechanisms of NG decomposition during storage, thermal decomposition experiment and quantum mechanical analysis were performed. The concentrations of NO, NO<sub>2</sub> and CO were monitored and the process of NG decomposition can be divided into two stages on the basis of NO<sub>2</sub> concentration. The reactants, intermediates and products of four kinds of initial reaction channels and the rate constants were calculated by DFT/6-31G\*\* and CVT/SCT, respectively.

## Different Methods for Developing Relaxation Modulus Master Curves of AP-HTPB Solid Propellant

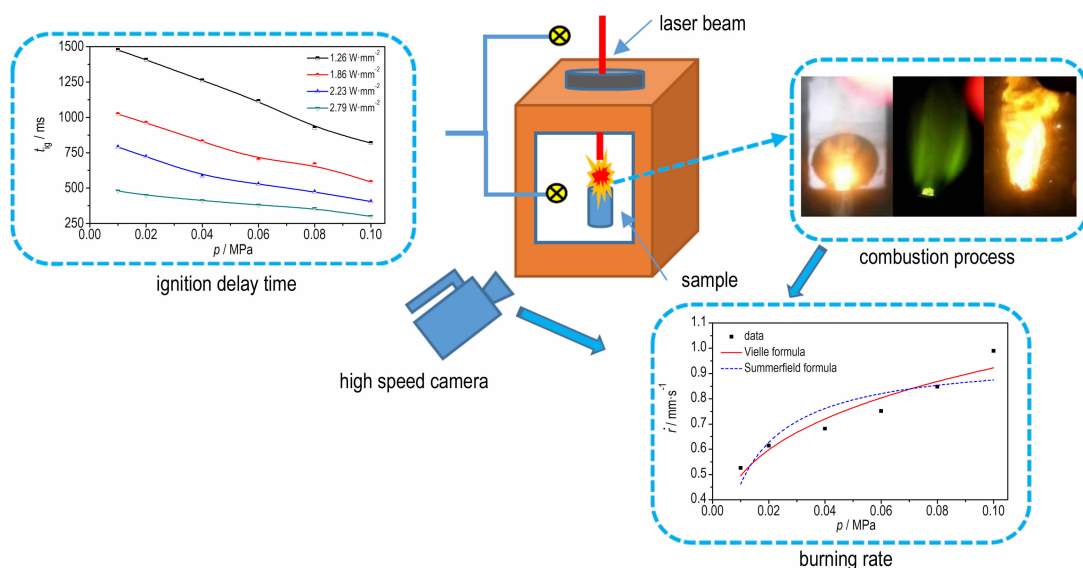


A comparative assessment of Williams-Landel-Ferry (WLF) method, the Arrhenius method, and the basic time-temperature superposition (TTS) method used for estimating and generating the relaxation modulus master curves of ammonium perchlorate-hydroxyl-terminated polybutadiene (AP-HTPB) solid propellant was carried out.

Walid M Adel, LIANG Guo-zhu

*Chinese Journal of Energetic Materials*, 2017, 25(10): 810–816

## Laser Ignition and Combustion Characteristics of Al/Mg Fuel-rich Propellant at Subatmospheric Pressures

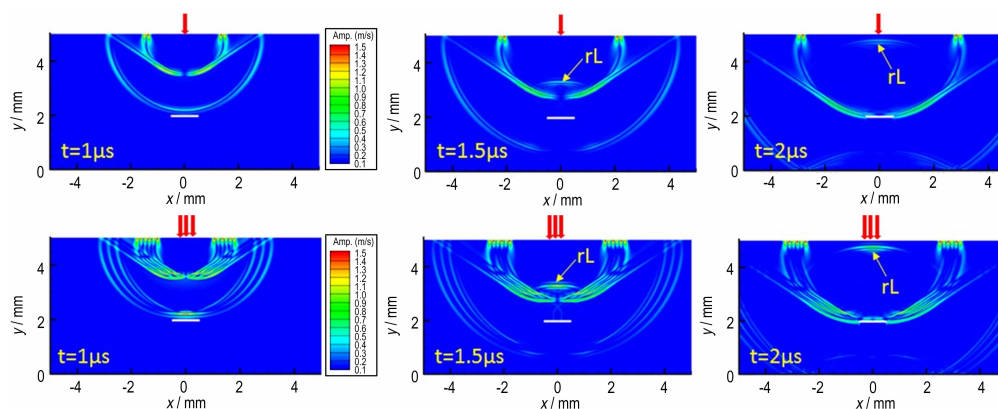


Al/Mg fuel-rich propellant was ignited by CO<sub>2</sub> laser with different heat fluxes at subatmospheric pressures to study the effect of subatmospheric pressures on the ignition and combustion characteristics of propellant. The ignition and combustion process of propellant was recorded by a high speed camera. The ignition delay time was obtained by two photodiodes which monitor the laser signal and flame signal. The effect of subatmospheric pressures on the ignition delay time, combustion process and linear burning rate of the propellant was discussed.

LAI Hua-jin, CHEN Xiong, ZHOU Chang-sheng,  
XIANG Heng-sheng

*Chinese Journal of Energetic Materials*, 2017, 25(10): 817–821

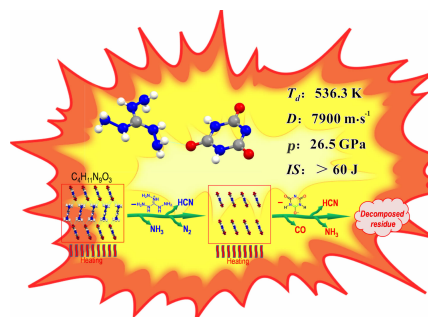
### Numerical Simulation of Laser Ultrasonic Nondestructive Testing of Internal Defects in PBX



A non-contact and nondestructive testing method of internal defects in PBX based on laser ultrasonic technique was studied. It is found that the defect signals in PBX can be enhanced with keeping the same temperature of PBX by using multi-beam laser generation.

PEI Cui-xiang, YI Dong-ci, LIU Wen-wen, ZHOU Hai-qiang  
*Chinese Journal of Energetic Materials*, 2017, 25(10): 822–828

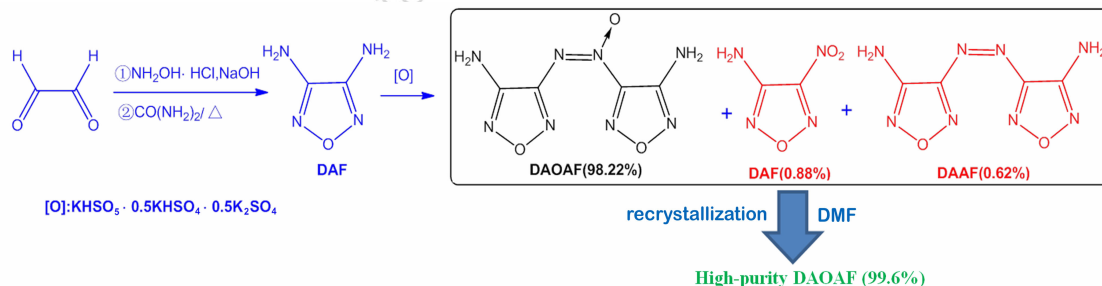
### Synthesis, Crystal Structure and Thermal Decomposition of Triaminoguanidinium 2,4,6-Trioxo-1,3,5-triazinan-1-ide Based on Cyanuric Acid



Triaminoguanidinium 2,4,6-trioxo-1,3,5-triazinan-1-ide was prepared via one-step metathesis reaction using triaminoguanidinium hydrochloride (TAG-HCl) and sodium cyanurate (CANa) as raw materials. The structure of the product was characterized by X-ray single-crystal diffraction, UV-Vis, FT-IR, <sup>1</sup>H NMR, mass spectrometry and elemental analysis.

LIU Qiang-qiang, JIN Bo, ZHANG Qing-chun, SHANG Yu, GUO Zhi-cheng, PENG Ru-fang  
*Chinese Journal of Energetic Materials*, 2017, 25(10): 829–837

### Synthesis of High-purity 3,3'-Diamino-4,4'-azoxyfuran (DAOAF)

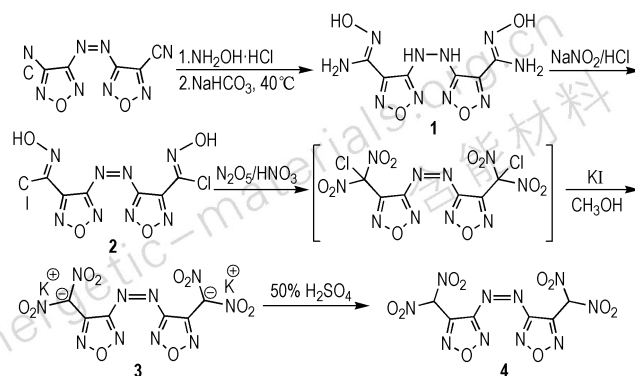


WANG Xiao-xu, ZHANG Yong, HUNG Ming, CHEN Ming-long, MENG Yu-fu, SUO Zhi-rong, YANG Hai-jun, LI Hong-bo

*Chinese Journal of Energetic Materials*, 2017, 25(10): 838–842

3,3'-Diamino-4,4'-azoxyfuran (DAOAF) was successfully obtained through the reaction of DAF and potassium monopersulfate triple salt ( $\text{KHSO}_5 \cdot 0.5\text{KHSO}_4 \cdot 0.5\text{K}_2\text{SO}_4$ ) as oxidant in the buffer system of  $\text{NaHCO}_3$  solution. Its structure was characterized and purity was determined.

### Synthesis and Thermal Properties of 4,4'-Bis(dinitromethyl)-3,3'-azofurazan

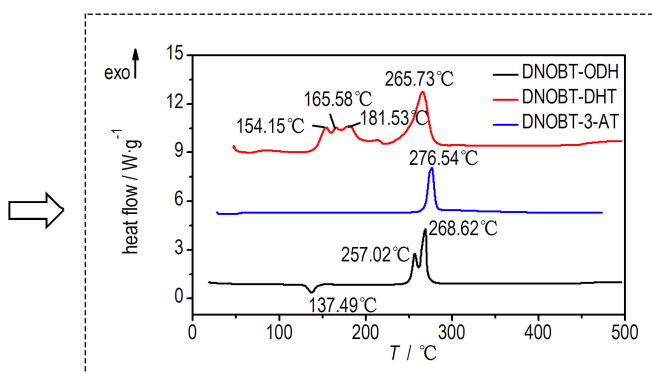
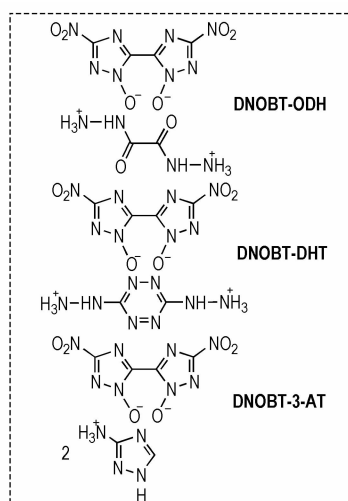


4,4'-Bis(dinitromethyl)-3,3'-azofurazan (4) and potassium 4,4'-bis(dinitromethyl)-3,3'-azofurazanate (3) were synthesized from 4,4'-dicyano-3,3'-azofurazan through addition, diazotization and nitration. A new furazan, 4,4'-aminoxim-3,3'-hydrazinefurazan (1), was obtained in the synthesis process of 4. The intermediates and product were analyzed by  $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR, IR and mass spectrum.

HUANG Xiao-chuan, WANG Zi-jun, QIN Ming-na, GUO Tao, LIU Min, QIU Shao-jun

*Chinese Journal of Energetic Materials*, 2017, 25(10): 843–847

### Synthesis, Crystal Structure and Performance of 3,3'-Dinitro-5,5'-bis-1,2,4-triazole-1,1'-diolate Energetic Ionic Salts

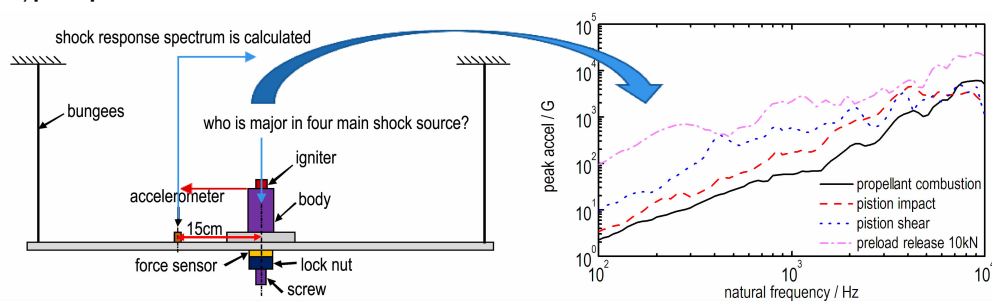


Three energetic ionic salts (DNOBT-3-AT, DNOBT-ODH, DNOBT-DHT) were synthesized by using 3,3'-dinitro-5,5'-bis-1,2,4-triazole-1,1'-diolate (DNOBT) as starting material and reaction with 3-amino-1,2,4-triazole, oxalyl dihydrazide, 3,6-dihydrazine-1,2,4,5-tetrazine, respectively, and their structures were characterized by FT-IR, NMR and elementary analysis. The single crystal of DNOBT-3-AT was cultivated and its crystal structure was determined by X-ray crystallography. Their physico-chemistry and detonation properties were calculated by Gaussian 09 program and Kamlet-Jacobs formula. Meanwhile, the thermal behaviors of the three compounds were studied by differential scanning calorimetry.

LUO Yi-fen, BI Fu-qiang, WANG Bo-zhou, ZHOU Cheng, LI Ya-nan

*Chinese Journal of Energetic Materials*, 2017, 25(10): 848–852

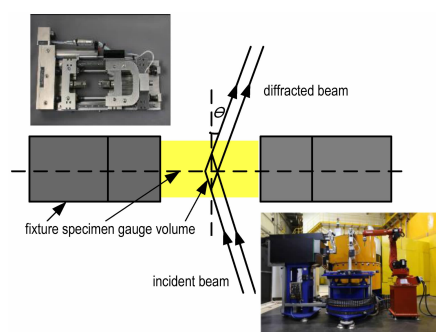
## Decoupling Test and Characteristic of Pyrotechnic Shock Effect of Shear Type Explosive Bolt



LI Yan-hua, WEN Yuan-quan, LI Yuan, XIONG Shi-hui,  
HOU Hui-min, LI Zhi-liang  
*Chinese Journal of Energetic Materials*, 2017, 25(10): 853–859

Four main generated shock sources of a shear type explosive bolt were decoupled and tested respectively, and individual shock response was calculated and compared with the overall shock response. The major contributor to the output shock of a shear type explosive bolt was revealed.

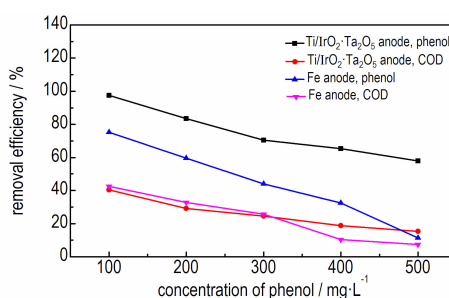
## Internal Stress Measurement During Uniaxial Compression for TATB Based PBX by Neutron Diffraction



XU Yao, WANG Hong, LI Jian, ZHANG Wei-bin,  
SUN Guang-ai  
*Chinese Journal of Energetic Materials*, 2017, 25(10): 860–865

The internal stress alterations were measured through the in-situ neutron diffraction during quasi-static uniaxial compression, while Deben Microtest 2 kN dual leads crew mounted horizontally on the Residual Stress Neutron Diffractometer (RSND).

## Degradation of Phenol Wastewater by Electro-Fenton Method with Dimensionally Stable Anode of Ti/IrO<sub>2</sub>-Ta<sub>2</sub>O<sub>5</sub>



GAO Jing, YAN Jun-juan, LIU You-zhi, GUO Zhi-yuan,  
GUAN Zhang-bin  
*Chinese Journal of Energetic Materials*, 2017, 25(10): 866–872

The effect of phenol concentration on removal efficiency were investigated with Ti/IrO<sub>2</sub>-Ta<sub>2</sub>O<sub>5</sub> and Fe as anode.

## Progress on Synthesis of Heat-resistant Aromatic Energetic Compounds

ZHANG Jun-lin, ZHOU Jing, BI Fu-qiang, HUO Huan,  
HU Huai-ming, WANG Bo-zhou

*Chinese Journal of Energetic Materials*, 2017, 25(10): 873–880

The progress in the synthesis, thermal stabilities and applications of heat-resistant aromatic energetic compounds were reviewed. The design of the molecule structures and the stabilization effects originated from conjugated aromatic ring system and intermolecular hydrogen bonds were mainly discussed.

Executive editor: ZHANG Qi WANG Yan-xiu GAO Yi JIANG Mei