

Recent Advances in Energetic Molecule Synthesis

TIAN Jun-jun, ZHANG Qing-hua, LI Jin-shan

Chinese Journal of Energetic Materials, 2016, 24(1): 1–9

The progress on energetic molecular synthesis within recent two years was reviewed with 43 references.

A New Sensitivity Criterion of Explosives: Bonding & Nonbonding Coupling Related Molecular Rigidity and Flexibility

TAN Bi-sheng, HUANG Ming, LI Jin-shan, LONG Xin-ping

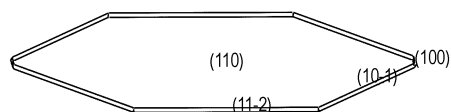
Chinese Journal of Energetic Materials, 2016, 24(1): 10–18

The core idea of the method 'Bonding & Nonbonding Coupling Related Molecular Rigidity and Flexibility' can be expressed as balancing stiffness and compliance of an explosive in the molecular designs, and this method is a new sensitivity criterion of explosives.



Molecular Dynamics Simulation on the Crystal Morphology of 2,6-Diamino-3,5-dinitropyridine-1-oxide

SHI Wen-yan, WANG Feng-yun, XIA Ming-zhu, LEI Wu

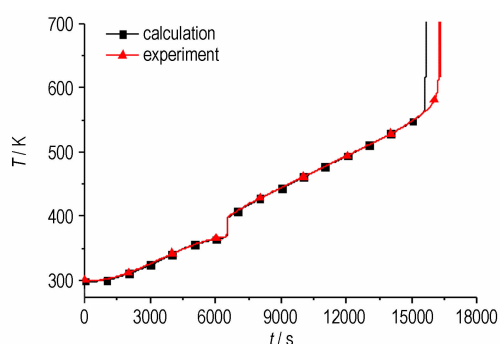
Chinese Journal of Energetic Materials, 2016, 24(1): 19–26The attachment energy (AE) models were employed to predict the growth morphology and the main crystal faces of 2,6-diamino-3,5-dinitropyridine-1-oxide (ANPyO) in vacuum. The molecular dynamics (MD) simulation was applied to investigate the interaction of ANPyO crystal faces and *N,N*-dimethylformamide (DMF) solvent, and the growth habit of ANPyO in DMF was predicted using the corrected AE model.

Research on the Cook-off Characteristics of DNAN Explosive

CHEN Lang, LI Bei-bei, MA Xin

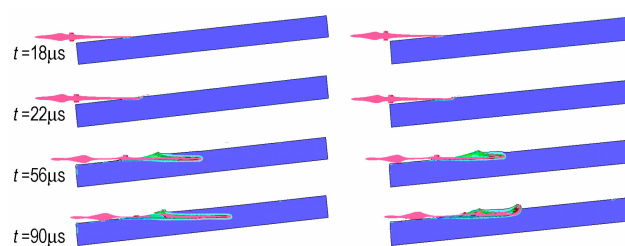
Chinese Journal of Energetic Materials, 2016, 24(1): 27–32

The cook-off bomb test of DNAN was carried out to measure the temperature variation and observe the reaction process inside the explosive. A thermal reaction model of fused cast explosive was established, and the phase transition process was described by using an enthalpy-porosity method.



Numerical Simulation and Experimental Research on the Effect of Target Material on the Ricochet Angle of Shaped Charge Jet

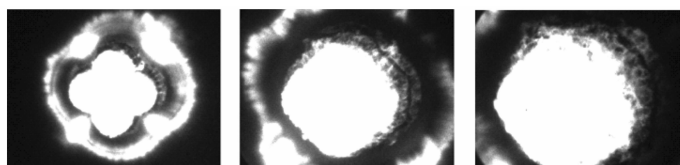
ZHAO Fang-xuan, SHEN Zhao-xin, LIU Ning, LI Ru-jiang
Chinese Journal of Energetic Materials, 2016, 24(1) : 33–37



The ricochet process of shaped charge jet penetration different material target, including 603 armor steel and aluminum, with a small incidence angle ranging from 5° to 7° was numerically simulated by using ANSYS/LS-DYNA software. Their penetration and ricochet process were observed.

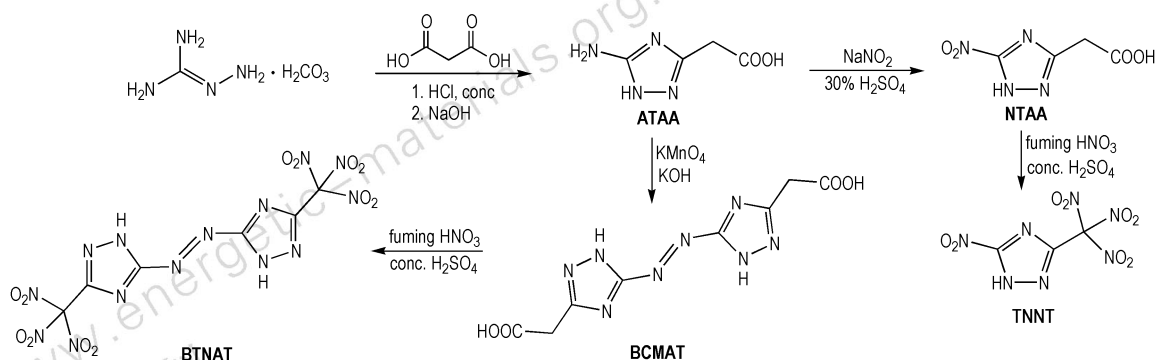
Simulation and Experimental Studies on the Multi-point Synchronization Detonation Overpressure of Slapper Detonators

HAN Ke-hua, REN Xi, LI Hui, ZHANG Yu-ruo, CHU En-yi
Chinese Journal of Energetic Materials, 2016, 24(1) : 38–44



The simulation of detonation wave pressure of the three-point, four-point, six-point, eight-point synchronization initiation for slapper detonators were performed respectively by the finite element program AUTODYN software. The factors affecting the detonation wave pressure of multi-point synchronous initiation were analyzed. The detonation wave pressure of multi-point synchronization initiation for slapper detonators was measured by a Manganese Bronze manometry. The action process of four-point synchronization slapper detonators were filmed by a high speed photography system.

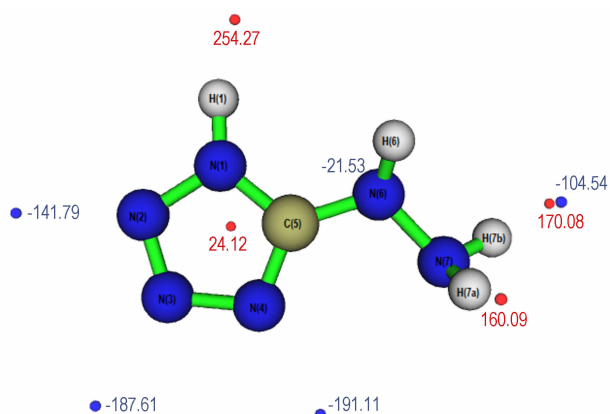
Synthesis and Theoretical Studies of 5-Nitro-3-trinitromethyl-1H-1,2,4-triazole and 5,5'-Bis(trinitromethyl)-3,3'-azo-1H-1,2,4-triazole



XIAO Xiao, YAO Er-gang, LIU Qing, DING Ke-wei,
SU Hai-peng, LI Tao-qi, ZHANG Min, GE Zhong-xue
Chinese Journal of Energetic Materials, 2016, 24(1) : 45–52

5-Nitro-3-trinitromethyl-1H-1,2,4-triazole (TNNT) and 5,5'-bis(trinitromethyl)-3,3'-azo-1H-1,2,4-triazole (BTNAT) were synthesized via condensation-cyclization, diazotization-substitution, oxidation-coupling and nitration reaction using aminoguanidinium hydrogen carbonate and malonic acid as raw materials, respectively.

Synthesis, Characterization and Properties of Perchlorate Complexes with 5-Hydrazinotetrazole as Ligand

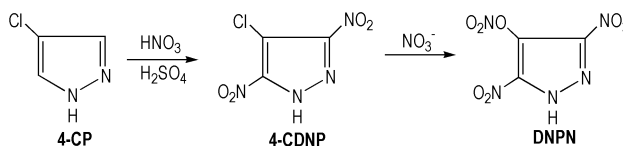


Five perchlorate complexes with 5-hydrazinotetrazole (5-HT) as ligands were prepared. Their structures were characterized. The thermal decompositions were studied by differential scanning calorimetry and the impact sensitivity and friction sensitivity were also tested. The theoretical calculations of the electronic structure, natural bond orbital charge and frontier orbital energy of 5-HT were studied at B3LYP/6-311++g** level.

ZHANG Zhi-bin, ZHANG Jian-guo, XU Cai-xia, YIN Xin,
HE Piao

Chinese Journal of Energetic Materials, 2016, 24(1): 53–59

Synthesis and Characterization of 3,5-Dinitropyrazole-4-nitrate

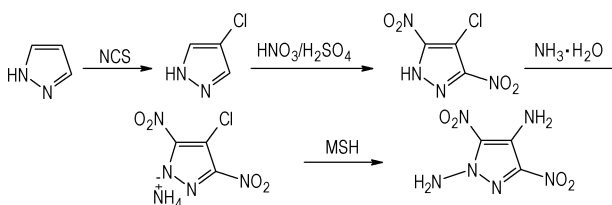


FENG Xiao-qin, CUI Jian-lan, CAO Duan-lin, LI Yong-xiang,
WANG Jian-long

Chinese Journal of Energetic Materials, 2016, 24(1): 60–63

A novel energetic material, 3,5-dinitropyrazole-4-nitrate (DNPN), was synthesized via nitration and nucleophilic substitution reaction using 4-chloropyrazole as raw material, and its structure was characterized by FTIR, NMR and elemental analysis.

Synthesis of 1,4-Diamino-3,5-dinitropyrazole

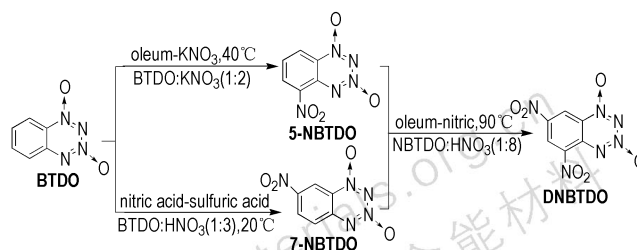


ZHAO Dan, CAI Chun

Chinese Journal of Energetic Materials, 2016, 24(1): 64–68

1,4-Diamino-3,5-dinitropyrazole was synthesized from pyrazole via halogenation, nitration and amination reaction. The thermal behavior was studied by DSC.

Nitration Process of Benzo-1, 2, 3, 4-tetrazine-1, 3-dioxide

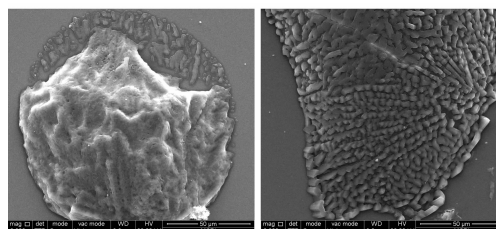


5-Nitrobenzene-1,2,3,4-tetrazine-1,3-dioxide (5-NBTDO) and 7-nitrobenzene-1,2,3,4-tetrazine-1,3-dioxide (7-NBTDO) were synthesized using benzo-1,2,3,4-tetrazine-1,3-dioxide (BTDO) as raw material. Then the 5,7-dinitrobenzene-1,2,3,4-tetrazine-1,3-dioxide (DNBTD0) was synthesized by 5-NBTDO and 7-NBTDO as raw material. HPLC was used to analyze the yields of the products. The structures of these synthesized compounds were characterized by ¹H NMR, ¹³C NMR, IR and MS.

WEI Wen-jie, ZHENG Chun-mei, WANG Tian-yi,
ZHANG Tao, XU Li-wen, XIA Cheng-bo, WANG Feng-yun,
LEI Wu, XIA Ming-zhu

Chinese Journal of Energetic Materials, 2016, 24(1) : 69-73

Difference Analysis between Solidification Behavior of DNTF and TNT

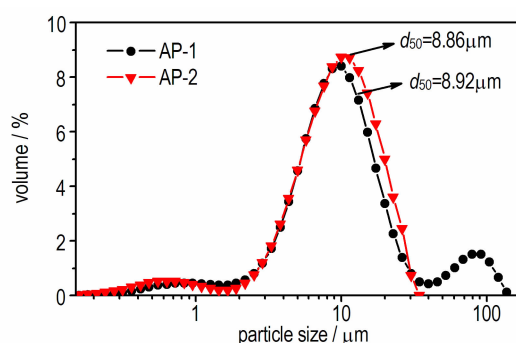


The solidification behavior of DNTF and TNT were contrasted and analyzed. The volume shrinkage of DNTF and TNT was tested. The distribution of solidification defect of DNTF and TNT was observed by industrial CT and scanning electron microscope. Thermal performance parameters of DNTF and TNT were tested by DSC and thermal conductivity measurer. The curves of temperature vs. time describing the solidifying process of DNTF and TNT were obtained by a solidification rate test device.

LUO Yi-ming, ZHAO Kai, JIANG Qiu-li, WANG Hao,
WANG Hong-xing

Chinese Journal of Energetic Materials, 2016, 24(1) : 74-78

Application of Low-temperature Plasma Technique in Surface Modification of Superfine AP Powder



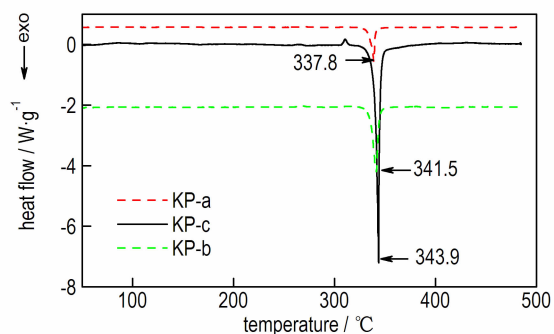
The surface modification treatment of the superfine AP powder was performed using low-temperature plasma equipment. The particle size and morphology of the superfine AP before and after treatment were characterized by a laser granularity analyzer and SEM. The component and purity of the superfine AP before and after treatment were analyzed by FTIR, Raman spectrometer, XRD, XPS and chemical method. The thermal decomposition performances of AP before and after treatment and the corresponding AP/Al system were studied by TG and DSC. The impact sensitivities, friction sensitivities and hydroscopicity were measured.

WAN Xue-jie, GUO Xiao-de, OUYANG Gang

Chinese Journal of Energetic Materials, 2016, 24(1) : 79-84

Preparation and Properties of Ultrafine Potassium Picrate

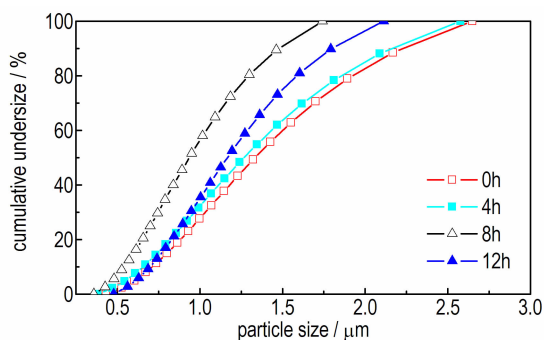
ZHAO Wen-yuan, CHEN Zhen-kui, ZHANG Tong-lai,
ZHANG Li-nong, ZHOU Zun-ning, YANG Li
Chinese Journal of Energetic Materials, 2016, 24(1): 85–90



To investigate the effect of particle sizes on properties of potassium picrate (KP), superfine potassium picrate was prepared by different reaction processes, including continuous spray, controlling dropping and fast mixing.

Preparation of Nanocrystalline Zr Powders by Mechanical Ball Milling and Their Burning Behavior

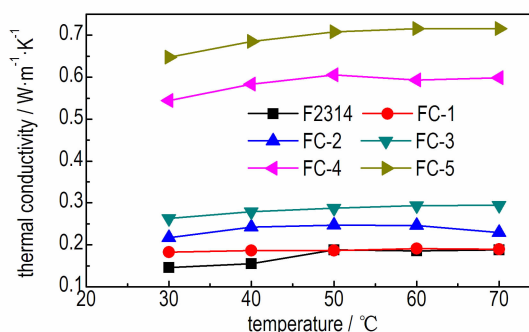
YANG Fan, KANG Xiao-li, LUO Jiang-shan, YI Yong,
TANG Yong-jian
Chinese Journal of Energetic Materials, 2016, 24(1): 91–95



We prepared different types of nanocrystalline Zr powder by mechanical ball milling, the phase composition, morphology characteristics, particle size distribution and BET specific surface area were tested. Then we put it into Zr/KClO₄ pyrotechnics to improve the combustion performance, the effect of particle size distribution on the optical radiation time performance of Zr/KClO₄ was studied.

Thermal Conduction Property of Fluoropolymer/multi-walled Carbon Nanotubes Composites

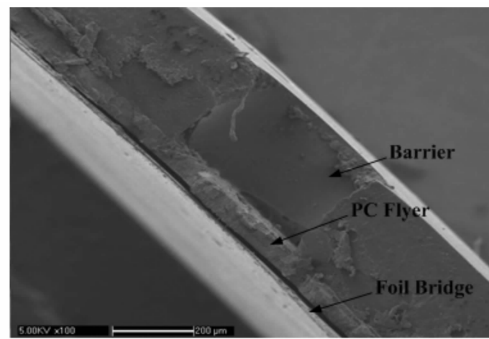
LIN Cong-mei, ZENG Gui-yu, LIU Jia-hui, HUANG Zhong,
GONG Fei-yan, ZHANG Jian-hu, LIU Shi-jun
Chinese Journal of Energetic Materials, 2016, 24(1): 96–100



Influences of multi-walled carbon nanotubes (MWCNTs) content and temperature on the thermal conductivity of F2314/MWCNTs composites were investigated by laser flash thermal conductivity apparatus.

Fabrication and Flyer Driving Capability of In-situ Integrated Exploding Foil Initiator

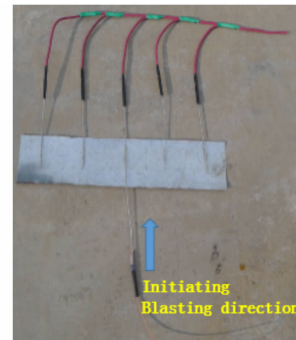
FANG Kuang, CHEN Qing-chou, HE Si-min, JIANG Xiao-hua
Chinese Journal of Energetic Materials, 2016, 24(1): 101–105



Photolithography and chemical vapor deposition (CVD) technique were employed to fabricate an integrated exploding foil initiator (EFI) with parylene C flyer and Su8-2150 barrier. The acceleration history of flyers of EFI driven with electrical explosion was obtained by the photonic doppler velocimetry (PDV) measure technique.

Heat Resistance and Explosion Transfer Performance in the Irreversible Detonating Network Applied in High Temperature Mine Blasting

WANG Fei, MA Hong-hao, SHEN Zhao-wu
Chinese Journal of Energetic Materials, 2016, 24(1): 106–110



A kind of blasting network, similar to the principle of diode, was designed and its performance was studied.

Executive editor: WANG Yan-xiu JIANG Mei ZHANG Qi