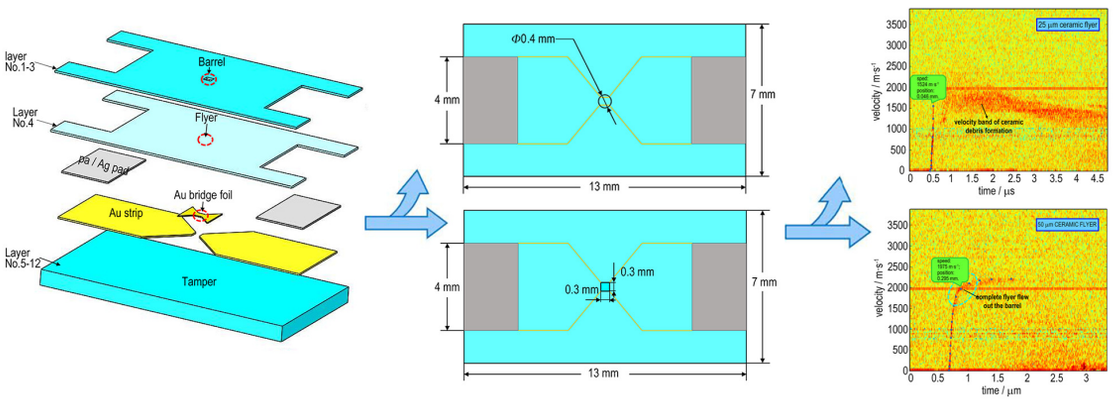
Design, Fabrication and Ignition Performance of LTCC Exploding Foil Initiation Chip

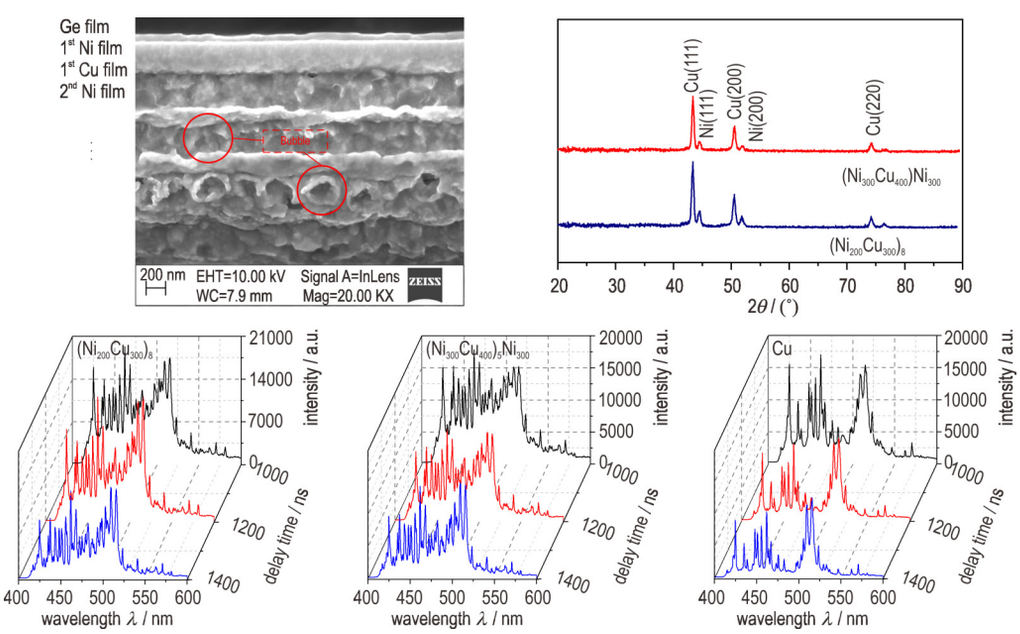


ZHANG Qiu, CHEN Kai, ZHU Peng, XU Cong, QIN Xin, YANG Zhi, SHEN Rui-qi

Chinese Journal of Energetic Materials, **2019,27(6):448−455**

Exploding foil initiation chips with the barrel of circular and square were designed and fabricated by low temperature co-ired ceramic (LTCC) technique. The flyer was made of 25 μm or 50 μm raw ceramics. Au slurry was printed on the ceramic substrates by screen printing. The velocity characteristics of ceramic flyer and its integrity were analyzed by Photon Doppler Velocimetry. HNS explosive was successfully detonated and BPN powder was ignited by the chip, which verified the feasibility of preparing exploding foil initiation chip by LTCC.

Plasma Spectrograph and Driving Flyer Properties of Electrically Exploded Ni/Cu Multilayers

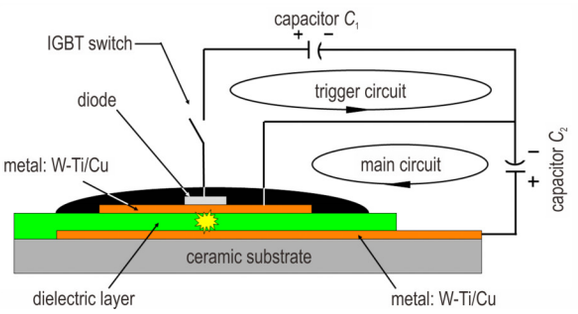


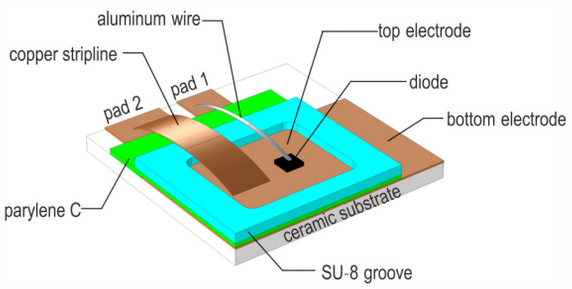
YANG Shuang, SUN Xiu-juan, WANG Wan-jun, FU Qiu-bo

Chinese Journal of Energetic Materials, **2019,27(6):456−464**

The plasma emission spectroscopy and the velocity of flyer driven by Ni / Cu composite multilayers (modulation period 200 nm/300 nm and 300 nm/400 nm, respectively) and pure Cu and Ni films with the same thickness prepared by electrochemical deposition were measured.

Conduction Mechanism of the Single Shot Switch Based on Electro-explosion of Diode



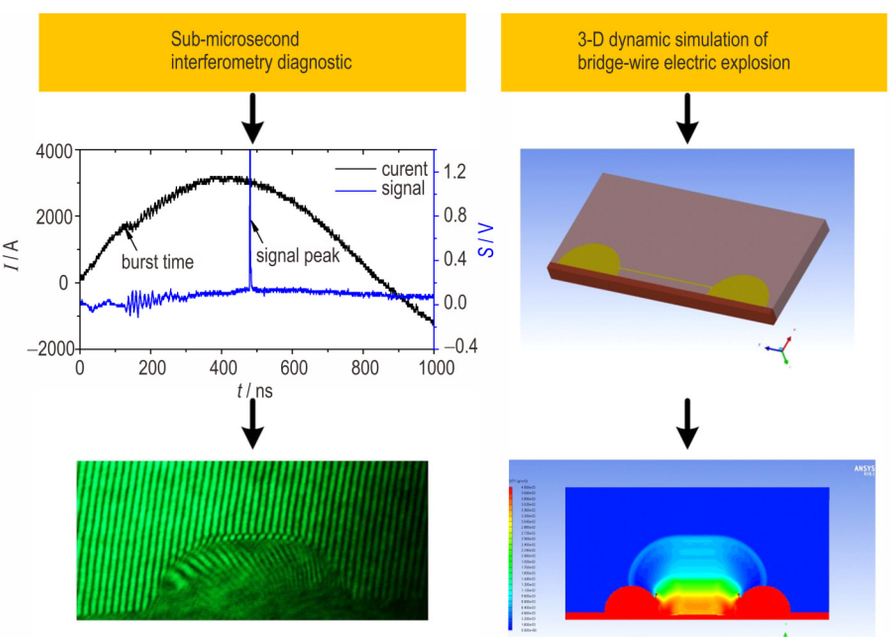


XU Cong, HU Bo, ZHU Peng, YE Ying-hua, SHEN Rui-qi

Chinese Journal of Energetic Materials,2019,27(6):465-472

Two kinds of single shot switches based on Schottky diode and p-n diode were fabricated using microelectro mechanical system (MEMS) technologies including magnetron sputtering, ultraviolet lithography and chemical vapor deposition. Then, the influence of trigger capacitor, trigger voltage, main voltage, dielectric film thickness and bi-diode structure on the conduction performance of single shot switch was studied. Finally, the conduction mechanism and resistance model of single shot switch were established.

Sub-microsecond Interferometry Diagnostic and 3D Dynamic Simulation of the Bridgewire Electrical Explosion

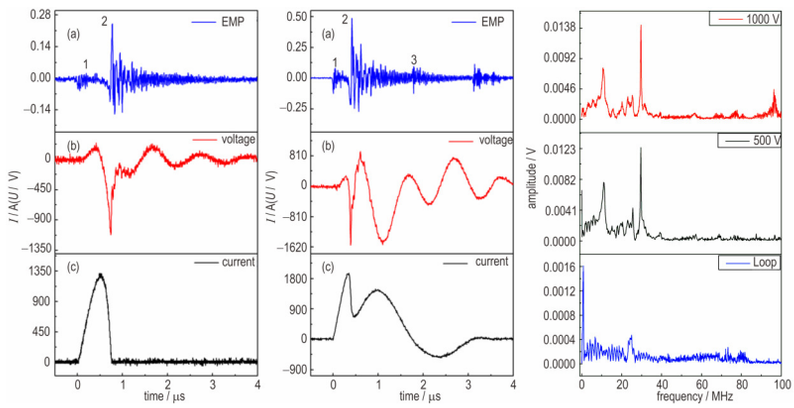


WANG Wan-jun, SUN Xiu-juan, ZHANG Lei, LEI Fan, GUO Fei, YANG Shuang, FU Qiu-bo

Chinese Journal of Energetic Materials,2019,27(6):473-480

The expansion of plasma generated in wire electric explosion was captured using interferometry diagnostic. Moreover, the transient current during electric explosion was also measured in order to establish the synchronous relationship between the current and plasma expansion. 3D dynamic simulation of plasma expansion was conducted, in which the JWL equation of state containing energy term was selected to describe the dynamic behavior of plasma.

Electromagnetic Pulse Effect During the Bridge Wire Electric Explosion

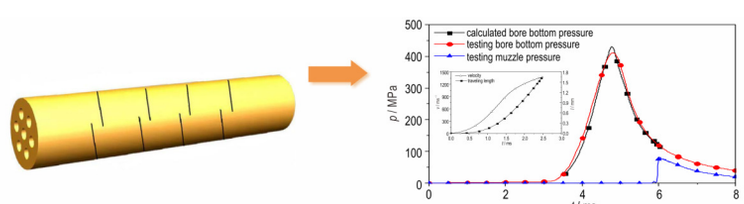


The burst current, the burst voltage and the generated electromagnetic pulse signal were measured during the electric detonation process. The analysis of the duration and frequency of the electromagnetic pulse for different explosion states was carried out to justify the electric detonation state.

ZHAO Li-jun, YI Tao, ZHU Hong-na, FU Qiu-bo, SUN Xiu-juan, YANG Shuang, ZHENG Wan-guo, JIANG Shao-en

Chinese Journal of Energetic Materials,**2019,27(6):481-486**

Numerical Simulation of the Interior Ballistic Performance for Partially Cut Multi-perforated Stick Propellants

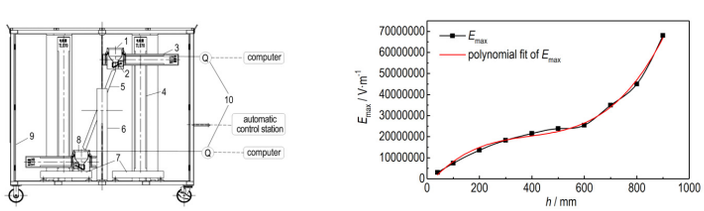


A simulation model of the interior ballistic performance for partially cut multiperforated stick propellants was established based on the classical interior ballistic theory. And the experiments were done to validate the calculated precision of the model. The effect of incision intervals, incision web, incision depth upon the interior ballistic performance was studied by numerical simulation.

ZHAO Yu-hua, YANG Wei-tao, YAN Wen-rong, ZHANG Jiang-bo, XIAO Xia

Chinese Journal of Energetic Materials,**2019,27(6):487-492**

Electrostatic Performance Test and Risk Assessment of Propellant Mixing Process



Devices were designed to test electrostatic parameters such as resistivity, dielectric constant and charge accumulation. ANSOFT MAXWELL software was used to simulate the electrostatic field in mixing silo of 11/7 propellant, obtaining the change curve of the maximum field strength with powder's height in 1000 mm diameter mixing silo.

WEI Shui-ai, SUN Lei, LI Wen-hai, LI Chun-guang, BAI Chun-hua

Chinese Journal of Energetic Materials,**2019,27(6):493-500**

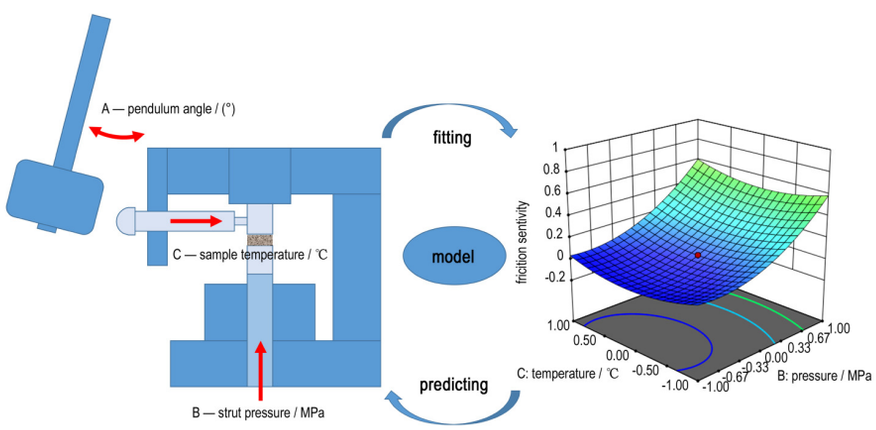
Synthesis and Performance of High-density and High-thixotropy Gelled Hydrocarbon Fuels

Four kinds of gelled high-density fuels formed by SiO_2 and Gn were synthesized. Compared with SiO_2 gelled hydrocarbonfuels, Gn gelledhydrocarbon fuels show higher thixotropy and rheology, along with better thermal and centrifugal stability. Additionally, the addition amount of Gn for gelling the fuels is not greater than 1% with little influence on the density and heat value of the fuels.

E Xiu-tian-feng, PAN Lun, ZHANG Xiang-wen, ZOU Ji-jun

***Chinese Journal of Energetic Materials*,2019,27(6):501−508**

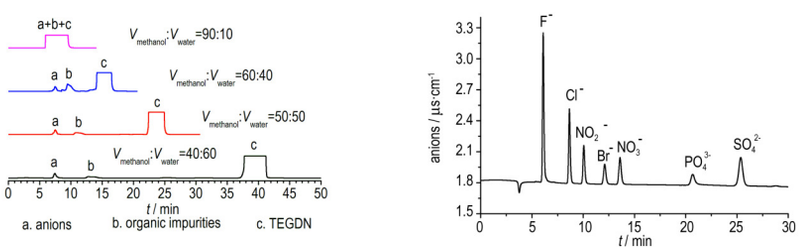
Theory of Friction Sensitivity of Solid Propellants Based on Center Composite Design of Response Surface



SHAO Ming-wang, WANG Jian, QIAO Xiao-lin, LI Xing-gang, ZHAO Hui

***Chinese Journal of Energetic Materials*,2019,27(6):509−515**

Determination of Anionic Impurities in Triethylene Glycol Dinitrate (TEGDN) by Preparative Liquid Chromatography-Ion Chromatography Method

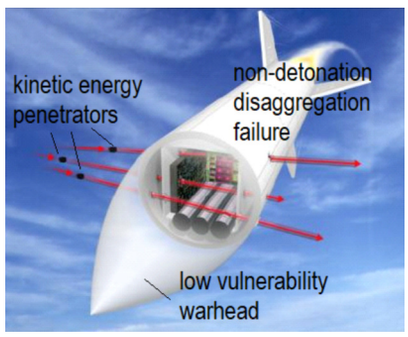


A simple and rapid preparative liquid chromatography-ion chromatography method for the determination of anionic impurities in triethylene glycol dinitrate (TEGDN) was established. The chromatographic conditions were selected and optimized. The anionic impurities in TEGDN were determined.

CHEN Shuang, KANG Ying, HU Yin, NING Yan-li, SUO Zhi-rong

***Chinese Journal of Energetic Materials*, 2019,27(6):516−520**

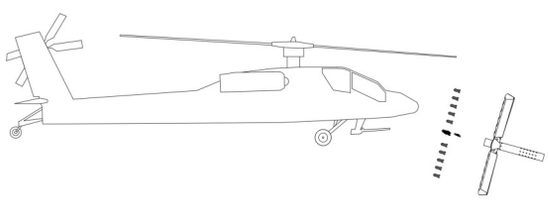
Deflagration Failure of Explosive Cased Charge Under Impact of Kinetic Energy Penetrators



The deflagration disaggregation failure of cased charge under impact of kinetic energy penetrators was studied. The relations between deflagration failure and detonation failure were analyzed and the lower limit value of deflagration failure criterion was given.

FENG Shun-shan, ZHAO Yu-feng, BIAN Jiang-nan, ZHOU Tong
Chinese Journal of Energetic Materials,2019,27(6):521-527

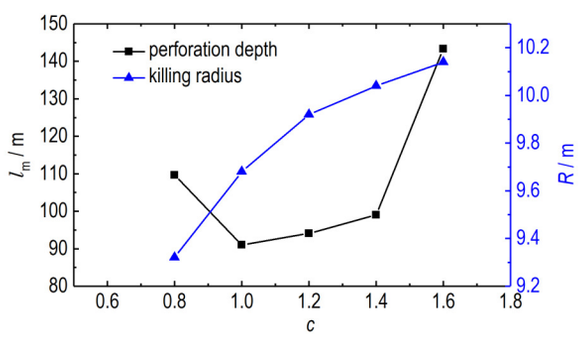
Design and Optimization of Directional and Focusing Multi-EFP Warhead

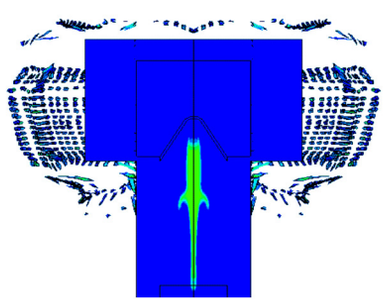


A multi-EFP directional focusing warhead is proposed and designed, which can control almost all the damage elements formed by the warhead explosion to the target orientation, so that the number of damage elements in the target orientation is further increased, and the damage capability to the target is greatly enhanced.

SI Kai, LI Xiang-dong, ZHOU Lan-wei, CHEN Xing
Chinese Journal of Energetic Materials,2019,27(6):528-534

Numerical Simulation of the Influence of Charge-shell Mass Ratio on the Damage Power of Anti-armor and Anti-personnel Composite Warhead





The theoritical analysis mehtod was taken for calcutating the formation and killing radius of fragments. The non-linear dynamics software LS-DYNA was used to analyze the depth of armor penetration by jet, then the curves describing the relationships of the charge-shell mass ratio vs. the killing radius and perforation depth of fragments were obtained.

LI Xing-long, CHEN Ke-quan, LU Zhong-hua, GAO Da-yuan, LÜ Sheng-tao, KOU Jian-feng, YANG Sha
Chinese Journal of Energetic Materials, 2019,27(6):535-540