

SHOCK19-2019-000721

Abstract for an Invited Paper
for the SHOCK19 Meeting of
the American Physical Society

Synthesizing nitrogen-rich compounds and investigating their as ingredients of novel composite propellants

MATEUSZ SZALA, Department of Explosives, Military University of Technology

High-nitrogen azotetrazole salts were synthesized, characterized and used as nitrogen-rich compounds for the preparation of novel composite propellants. Triaminoguanidinium and guanidinium azotetrazolate (TAGAZ, GUAZ) were selected based on the results of thermic and sensitivity measurements. Nitrocellulose was used as a traditional ingredient of propellants, while dibutyl phthalate and 3-methyl-3-nitroxymethyloxetane (NIMMO) was used as a plasticizer. The ingredients and resulting propellants were tested using differential thermal analysis coupled with a thermogravimetric method. Standard pyrostatic tests in a closed chamber were also conducted and characteristic ballistic parameters were calculated. Both of the high-nitrogen compounds that were tested could be potential ingredients of future propellants. The pressure rise rate for the tested propellants is simply correlated with TAGAZ/GUAZ content. NIMMO is an interesting new plasticizer for nitrocellulose, although it exhibit relatively high volatility during DTA-TG tests which limits its utility. Topic 2.01.

In collaboration with: Leszek Szymanczyk, Zbigniew Surma, Marcin Hara, Military University of Technology