COMPARATIVE STUDIES OF THE PULSE OF EXPLOSIVE TRANSFORMATION OF NANOTHERMITES

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Abstract: A technique for tensometric determination of the pulse of fast-burning pyrotechnic compositions has been developed. The valus of specific impulse of nanoscale compositions CuO/Al, MoO_3/Al, Bi_2O_3/Al (nanothermites) as well as primary explosives (lead azide and lead trinitroresorcinate) were determined. The shock-wave nature of the process of explosive transformation of nanothermites is demonstrated.

Keywords: nanothermites; pyrotechnic compositions; initiating explosives; detonation; explosive transformation pulse

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Figure Captions

Figure 1 Images of nanothermites obtained using a scanning electron microscope: (*a*) CuO/Al 70/30 nanothermite; (*b*) MoO_3/Al 60/40 nanothermite; and (*c*) Bi_2O_3/Al 85/15 nanothermite

Figure 2 Schematic diagram of the impulse measuring device: *1* — force sensor T24A-0.02-C3; *2* — sample in the cap; *3* — battery $U = 10.8$ V; *4* — SR 570 preamplifier; *5* — PICO 212 oscilloscope; and *6* — personal computer

Figure 3 Calibrating dependence of the impulse on sensor deviation

Figure 4 Typical waveforms recorded during the explosive transformation of nanothermites CuO/Al 70/30 (60 mg) (*a*) and Bi_2O_3/Al 85/15 (60 mg) (*b*) and primary explosives lead azide (47 mg) (*c*) and lead trinitroresorcinate (51 mg) (*d*)

Figure 5 Dependence of the impulse of explosive transformation of nanothermites and primary explosives on the sample mass: *1* — PbN_6; *2* — lead trinitroresorcinate; *3* — Bi_2O_3/Al 85/15; *4* — CuO/Al 70/30; and *5* — MoO_3/Al 60/40

Table Caption

Comparison of calculated and experimental impulses of the studied substances

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