

**IGNITION BY LASER RADIATION AND COMBUSTION
OF COMPOSITE SOLID PROPELLANTS****VLADIMIR ARKHIPOV¹, NIKOLAY ZOLOTOROV¹ AND ALEXANDER KOROTKIKH²**¹*Research Institute of Applied Mathematics and Mechanics, Russia*²*National Research Tomsk Polytechnic University, Russia**leva@niipmm.tsu.ru*

The report presents measurement techniques for the recoil force, gasification time of products outflow from burning surface, burning rate of composite solid propellants (CSPs) with sampling of condensed combustion products (CCPs) to determine their size distribution, chemical and phase compositions, as well as the experimental study results of ignition and combustion of CSPs based on AP, an inert binder and aluminum ultrafine powder (UFP) type Alex, containing additives of iron and boron. It was found that the partial replacement 2 wt. % of Alex by iron UFP in CSP decreases the ignition time 1.3–1.9 times under initiation by CO₂-laser in the air at the range of heat flux density 55–220 W/cm² and increases the recoil force of gasification products outflow by 27 % in the period of stationary combustion and increases the burning rate 1.3–1.4 times at the range of nitrogen pressure 2.0–7.5 MPa. At the partial replacement 2 wt. % of Alex by boron UFP in CSP the ignition times are decreased 1.2–1.4 times, the recoil force of gasification products outflow is increased by 9 % and the burning rate of CSP does not change in the above pressure range.

This work was supported by the Ministry of Education and Science of the Russian Federation under Agreement No. 14.577.21.0157 of 11.28.2014 (unique identifier RFMEFI57714X0157).

Keywords: *Laser radiation, solid propellants, ignition delay time.*