



The Influence of the High-energy Electron Beam Irradiation on the Thermal Properties of the Aluminum Micron Powders

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Previously it was founded, that high-energy electron treatment could modify thermal properties of the nanopowders [1, 2]. Nevertheless, the thermal properties of the aluminum micron powders were not investigated. That is why the aim of this work was researching of the thermal oxidation properties of aluminum micron powders after irradiation. The chemical activity of the irradiated aluminum micron powders was investigated.

The aluminum micron powder (trademark ASD-6, ASD-6M, ASD-8, ASD-10) were undergone the electron beam treatment. The electron energy was 4 MeV and absorbed dose was 1.2 and 4 Mrad. It was established, that the temperature of the starting oxidation reduced from 550 °C to 515 °C. The oxidation rate increased on ~ 0.2 mg/min and outcome of aluminum oxide after oxidation increased too. After electron beam treatment the micron powders stored excess energy, which release during powder oxidation. The excess energy increased on 57.3 J/mol (ASD-6M) and 188.6 J/mol (ASD-10).

These results could be applied in various technical fields – 3D printing, sintering of the ceramics, high-energetic materials, pyrotechnics etc.

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[2] Mostovshchikov A.V., Ilyin A.P., Egorov I.S., Ismailov D.V. Key Eng. Mat., 2016, 712, 60-64.

