Abstract Submitted
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Synthesis of nanopowders of elements and compounds in thermal plasma ANDREY SAMOKHIN, NIKOLAY ALEXEEV, SERGEY KORNEV, MICHAEL SINAYSKIY, ALEXEY ASTASHOV, Institute of Metallurgy and Material Sciences Russian Academy of Sciences — Nanosized powders with particle size less than 100 nm are the base for production of various nanostructured materials with improved operating characteristics. Synthesis in thermal plasma of electric discharges is the advantageous process for producing nanopowders of elements and compounds. Production of inorganic nanosized powders in thermal plasma jet generated in DC arc plasma torch is considered. Reactor with intensively water-cooled walls is used for nanoparticles production by chemical condensation from gas during plasma jet propagation and cooling in the reactor volume. CFD simulation of the reactor with confined plasma jet is carried out and temperature and line of gas flow distributions are calculated as a function of thermal plasma initial conditions. The results of experimental investigations of synthesis of nanopowders (metals, oxides, carbides) in thermal plasma as well as the development of methods to control dispersed, phase and chemical composition of nanopowders during plasma process are developed and discussed. Plasma system for various inorganic nanopowders production by redox, decomposition and recondensation processes is designed and supplied to customers.

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