STRUCTURE AND PROPERTIES OF THE CERAMICS BASED ON THE COMPOSITION POWDERS FROM DUSTY PLASMA

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Using the plasma methods of particle surface processing we obtain the composite ceramics with improved performance data. The composite ceramics may be required in the production of functional materials for chemical and radiation-aggressive environments, structural elements for high pressures and temperatures in neutron diffraction studies of materials under these conditions, tool products. To incorporate homogeneously a small amount of binding material or modifying agent in the batch consisting of micron size particles is a problem of composite material production process. In this work the problem is solved by deposition of a thin coating on the initial powder particles by means of high-rate magnetron sputtering. The confinement of dusty particles in plasma was used in fine powder processing procedure.

Composite powders based on some materials were obtained: consisting of diamond particles with cobalt coating and of the Al-Cu-Fe quasicrystalline particles with nickel one. The composition of the obtained composite powders, structure and mechanical properties of compacts obtained by sintering at high pressure and temperature were studied. The results showed that the method provides sufficiently high uniformity incorporation of small quantities of additives (at concentration of about 3 wt. %) to fine powders. The conditions of sintering which provide producing compacts with improved performance data from the composition powders were established. The diamond compacts showed high densities and high elastic moduli. The quasicrystal based ceramics showed low friction coefficient and low wear. The noted material properties were provided by the complex of the methods used.

The work was supported by Rosatom contract #H.4x.44.90.13.1107 and NSh-493.2014.2.