

Nanocomposites and nanomaterials

Production of nanostructured and ultradisperse materials by means of volumetric electrospark erosion

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Nowadays, electrospark technologies for production of metal nanoscale and ultradisperse powders and alloys are one of the most effective methods that meet the requirements of the present scientific and applied problems. These technologies find their application in processes of coagulation water treatment, obtainment of nano- and ultradisperse metal powders, and, moreover, they are being tested as a method of bifunctional materials' fabrication.

Implementation of the low-voltage spark discharges was performed on technological unit, consisting of pulse generator, control unit, discharge chamber, and other measuring and auxiliary devices. Load on electrodes caused the occurrence of a current flow along the chain of randomly located granules in the stochastic switching mode. Study of the technological parameters' influence on dispersion and morphology of products of metal granules' erosion as a result of local electrospark discharges was performed through control over the discharge circuit's electrical parameters.

Investigation of plasma channels in contact areas between metal granules was carried out using the optical emission spectroscopy (OES) techniques, which allow to perform the noninvasive and express analysis and quantitatively determine numerous elements in a wide range of concentrations with acceptable accuracy. Knowledge of the underwater electric spark plasma parameters makes it possible to estimate the energy input and, correspondingly, to clarify the paths of energy dissipation of such process.