CHARACTERIZATION OF NANOSILICA PRODUCED BY ARC PLASMA METHOD

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Obtaining functional nanomaterials is a crucial task of modern science. Silicon dioxide nanopowder (nanosilica) is in demand in various industries and it is advisable to develop new methods for its production.

The research shows possibility of production and characterization of the structural and morphological properties of silicon dioxide nanoparticles obtained by arc plasma method [1-3]. This method allows to use available and environmental friendly natural high-silica materials such as diatomite, quartzite and quartz sand. The arc plasma method is based on physical processes of melting and evaporation of raw material under the influence of thermal plasma of electric arc discharge with subsequent condensation of nanoparticles.

Developed atmospheric pressure DC arc plasma installation was used to obtain the nanosilica. The main structural and morphological characteristics of the obtained nanoparticles were determined. The method of transmission electron microscopy (TEM) was used to study the morphology and size distribution. Brunauer–Emmett–Teller (BET) method was used to study the surface. Energy-dispersive (EDX) and X-ray photoelectron spectroscopies (XPS) were used to determine an elemental composition. The nature of chemical bonding of obtained nanopowder was characterized using a Fourier transform infrared (FTIR) absorption spectroscopy. To study the processes of phase transitions in raw materials after plasma influence, the method of X-ray diffraction (XRD) was used.

The particles of nanosilica obtained by arc plasma method have spherical shape, the size distribution 10-300 nm, the specific surface area 37-71 m^2/g.

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