ON THE POSSIBILITY OF NANODISPERSED SILICON DIOXIDE SYNTHESIS BY A COAXIAL MAGNETOPLASMA ACCELERATOR[1]

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There has been an increasing interest in production of nanopowders due to new properties of ceramics on their basis. Nanostructured ceramics have higher physical and chemical characteristics because properties depend on crystallite sizes [1]. Silica nanoparticles (or silicon dioxide SiO_2 nanoparticles) can be used for biomedical researches due to their stability and low toxicity and a circuits packaging industry as the preferred filler materials [2, 3]. It is necessary to produce a powder in the form of spheres. They have novel extremely high surface area catalyst effect and can be used as drug-delivery carriers and nano-reactors [4, 5].

This research paper presents the results of SiO_2 nanopowders synthesis by plasmadynamic method. It was realized in a hypersonic pulse jet of the Si plasma. The plasma jet was generated by a coaxial magnetoplasma accelerator (CMPA) [5]. The plasma jet expired in an air space of a reactor chamber. A micron crystalline silicone powder and an air space of the reactor chamber were used as precursors. The power supply of the CMPA is provided by a storage condenser with a battery capacity of C = 6 μF and a charging voltage U=3 kV.

The powder product was obtained using the above method and was investigated by modern analytical techniques such as X-ray diffractometry (a Shimadzu XRD 7000 diffractometer, CuKα radiation) and transmission electron microscopy (a Philips CM 30 electron microscope). The XRD data show presence of only amorphous SiO_2.

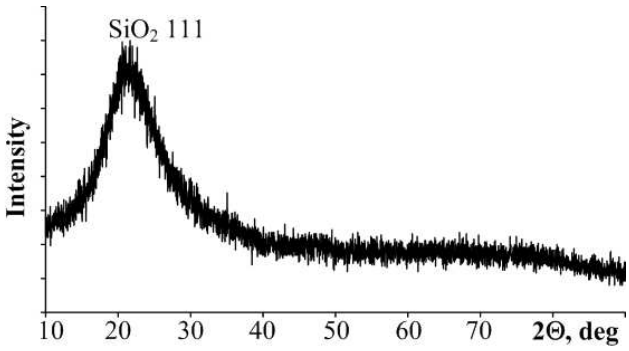

Fig. 1. The product XRD diffraction pattern

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