

INFLUENCE OF DIFFERENT PLASMA INITIATION WAYS ON OBTAINING ULTRADISPERSED SILICON CARBIDE

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Silicon carbide (SiC) has been used in many fields of human activity: power electronics, the production of abrasive materials and ceramic products for working in corrosive environments. SiC is used due to its properties: high hardness and wear resistance, wide forbidden zone, refractory [1-2]. The characteristics of the materials can be improved by using nanoparticles in their production.

Silicon carbide synthesis techniques are not effective enough, because they have unsatisfactory dispersity, high duration and other. The synthesis of ultradispersed SiC was carried out on a coaxial magnetoplasma accelerator (CMPA) [3]. This work is aimed at studying influence of different plasma initiation ways on the phase composition of the SiC. It was assumed that the method of initiation of the arc discharge will affect the phase composition of the synthesis product by changing the time and nature of the transition of the mixture of precursors to the plasma state.

The series of experiments were conducted with a different plasma initiation ways: carbon fibers and graphite aerosol (graphitization) . The precursors in experiments were carbon black and silicon powder, which were mixed. Power to the accelerator was supplied from a capacitive energy storage device. The results of experiments were the production of powdered products, which were studied by X-ray diffractometry (XRD) and transmission electron microscopy (TEM).

The result of this work is the optimization the plasma dynamic synthesis of nanoscale cubic silicon carbide using different plasma initiation ways. According to XRD and TEM, the SiC plasma dynamic synthesis proceeds more fully in the case of using graphitization as a plasma initiation way due to the more effective sublimation of precursors during preionization time. In this case product contains a phase of cubic silicon carbide β -SiC (~99%). Important advantage of the graphitization way is the high processability, which ensures the simplicity of the accelerator preparation and the reliability of its operation.

REFERENCES

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