

Thematic areas of International Summer School for young scientists "Nanotechnology: from fundamental research to innovations": Nanocomposites

Thermodynamics of reactions of crystalline phases formation in the three-component system SrO-Al₂O₃-SiO₂

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Strontium ceramics synthesized on the basis of strontium aluminosilicate is used for the creation of radio-ceramic materials, which must satisfy the requirements for low dielectric loss over a wide frequency range of electromagnetic waves and high thermal stability. Strontium aluminosilicates are of interest due to its high temperature resistance and other very valuable properties.

The paper presents the evaluation of the sequence of solid phase reactions in the three-component SrO-Al₂O₃-SiO₂ system, done with the help of thermodynamic method. It shows that the crystallization field of strontium anorthite was set in the system in the area of highly siliceous compositions belonging to the feldspathic minerals. Synthesis of strontium ceramics was carried out on the basis of different raw materials (natural and technical raw materials). However, ceramic materials are characterized by different properties depending on the phase composition and modificational form of strontium anorthite.

The value of Gibbs energy of reactions of strontium anorthite formation from various raw components in the temperature range of 773 to 1973 K was estimated on the basis of thermodynamic calculation.

The research had revealed that with the usage of pure oxides the fusion reaction of strontium anorthite proceeded at a higher temperature compared to the temperature of reaction in which metakaolin acted as a primary component.

The research of SrO-Al₂O₃-SiO₂ shows the perspectiveness of its further study for the development of radio-ceramic materials with high thermal resistance.