

Functional Materials Based on Cenospheres

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ABSTRACT

Owing to a favorable combination of technical and commercial characteristics, cenospheres are a valuable industrial product. They may be used for creating functional materials including filled composites based on inorganic and organic binders. Modification of cenosphere surfaces allows their positive properties to be intensified or new properties governing a specific material application to be imparted. In recent years the RFNC-VNIIEF has been developing functional materials using modified cenospheres. Based on cenospheres, the sorbents containing inorganic ion-exchange materials as modifiers have been synthesized. Sorbents show a high selectivity to radionuclides and may be used for decontamination of liquid radioactive waste. For example, under static sorption conditions the Cs¹³⁷ volume capacity of such sorbents is 10-30 mg/g. Based on the cement binder and modified cenospheres, an advanced heat-insulation structural material “Spheroconcrete” having 0.7-1.5 g/cm³ density and 60.0 MPa compression strength has been made. This material may be applied for making protective layers in containers for transportation and storage of fissile materials. Composite and polymer materials filled with modified cenospheres are being developed and studied. For example, injection into polyvinylchloride of cenospheres treated with a specific finishing agent makes it possible to produce a coating having antislip properties. Thus, the change in the character of surface modification of cenospheres may greatly expand the field of application of materials based on them.

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