

Article ID: 1003-7837(2005)02,03-0482-01

The glass-crystalline coatings on the basis of the basalts

Popovich A. A. , Andreev V. V.

(Far-Eastern State Technical University, Vladivostok)

Basalt is a basis for producing stone casting. The properties of stone casting considerably are influenced by composition of raw material. The raw material should satisfy to the following technological requirements; to have low melting point (1300–1400°C) and to easy produce homogenised melts; the melt should have sufficient liquidity and insignificant solidification shrinkage; the high crystallizing ability of a melt should give the needed phase composition of stone casting. The purpose of operation is research of technological properties of stone casting obtained from primorsky basalts. The technology of manufacturing stone casting produce is extremely energy consuming and requires special equipment. In Primorsky region some large basalt deposits have been prospected. High tariffs on the electric energy prevent developing energy consuming technological processes, including manufacturing stone casting from local resources. The only way out of the present situation is using basalt as a coating. As an object of investigation the basalts of Shkotovo plateau were chosen, whose chemical composition included the following components; $\text{SiO}_2 = 49.48\% - 54.86\%$, $\text{TiO}_2 = 1.32\% - 2.05\%$, $\text{Al}_2\text{O}_3 = 14.03\% - 15.95\%$, $\text{FeO} = 6.25\% - 8.25\%$, $\text{MgO} = 5.21\% - 8.80\%$, $\text{CaO} = 7.48\% - 8.33\%$, $\text{Na}_2\text{O} = 2.41\% - 3.23\%$. The results of the investigations showed that using basalt with the given chemical composition doesn't allow manufacturing high-quality coating on fire-brick. Due to this fact, basalt was burdened with the components, which allow decreasing its acid number and melting temperature, and also obtain stable pyroxene module. The furnace charge was coated as a dross on fire-brick, then dried and after that it was heat-treated, that is the produce was heated to 900–1200°C. The optimization of the conditions of the heat treatment was conducted to manufacture high-quality coating. After optimization of the conditions of the heat treatment the crystals of spherical shape are present in the structure, which formed constructional formation of pyroxene. The crystals of spheric shape had the smaller size, which amounted to 3 mcm. It was established, that thermal stability of the coating on fire-brick was not less than 15–20 thermal shifts.