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Article 1

Bushueva N. P., Kudeyarova N. P., Panova O. A.

Synthesis belite binder based on layered aluminosilicates

Bushueva N. P. (px_2011@list.ru), Candidate of Technical Sciences, *Kudeyarova N. P.,* Candidate of Technical Sciences, prof., *Panova O.A.,* graduate student, Shukhov Belgorod State Technological University, Belgorod

Key words: layered aluminoferrous silicates, biotite, structure, dicalcium silicate, calcium aluminates, synthesis, activity

Abstract

The coincidence of temperature intervals of decarbonization of $CaCO_3$ and dehydration of layered aluminosilicate muscovite and biotite contributes to the occurrence of solid-phase reactions at relatively low temperatures of 900–1250 °C, the appearance of aluminates of calcium and β-modifications $2CaO{\cdot}SiO_2$. The product roasting at temperatures 1200 °C in the mixture with quartz sand has a high activity under hydrothermal conditions, the compressive strength after six-hours of hardening is of 45,3 MPa.

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Article 2

Shachov S. A., Nikolaev N. Yu.

The improvement of molding properties to the charges based on silty loam by the introduction of highly dispersed composite additives

Shachov S. A. (sashakhov@mail.ru), Doctor of Technical Sciences**,** prof., *Nikolaev N. Yu.,* undergraduate student, Siberian Transport University, Novosibirsk

Key words: loam, water purification sediment, granulated blast furnace slag, coagulation structure, structural characteristics, molding properties, plastic molding

Abstract

Comprehensive experimental studies to structural characteristics of the molding compositions, which were derived from a low-grade clay raw material and modifying agents, characterizing by different genesis and morphology, carried out by using the mathematical planning. It was found that the deformation behavior of the molding compositions can be provided effective impact by choosing the ratio of differing genesis and morphology, particle components of complex additive. A joint introduction of the colloid (water purification sediment) and particles of thinning agent (blast furnace slag) in a ratio between those components at 1:1.5-2 is allowing to reduce of the proportion of plastic deformation and obtaining an optimal ratio with all kinds of deformations, and thus, improve molding properties of loam. It has selected optimal charge composition based on loam with a supplement of granulated blast slag and water purification sediment, according to the results of experimental studies.

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Article 3

Lukina Yu. S., Osipova P. A., Sventskaya N. V., Zaitsev A. E.
Synthesis and research of cement properties for bone grafting
Lukina Yu. S. (lukina_rctu@mail.ru), Candidate of Technical Sciences, *Osipova P. A.,* undergraduate, *Sventskaya N. S.,* Candidate of Technical Sciences, D. Mendeleev University of Chemical Technology, Moscow; *Zaitsev A. E.,* expert, JSC «CEMISKON», Podolsk, Moscow region

Key words: calcium phosphate cement, brushite, bone grafting

Abstract

Calcium phosphate cement for bone grafting has been synthesized. Various preparation's methods of tricalcium phosphate, which is one of the components for the production of cement, have been investigated. The influence of the synthesis methods of tricalcium phosphate on the final properties of the cement stone is established. Cement's compositions with the most suitable characteristics for medical purposes have been developed.

Article 4

Belyakov A. V., Zaw Ye Maw Oo, N. A. Popova, Ye Aung Min.The influence of the content of the burnable additives on properties of porous permeable ceramics from electrofusion corundum
Belyakov A. V. (av_bel@bk.ru), Doctor of Technical Sciences, prof., *Zaw Ye Maw Oo***,** doctoral candidate, *Popova N. A***.,** senior lecturer, *Ye Aung Min,* graduate student, D. Mendeleev University of Chemical Technology of Russia, Moscow

Key words: porous permeable ceramics, electrofusion corundum, open porosity, burnable additives

Abstract

Studied permeable porous ceramics obtained by the selection of granular compositions filled with electrofusion corundum brands F600 (100–120 μm), F360 (40–60 μm) and F120 (10–20 μm). The reinforcing binders used as fine powders of corundum (about 2 μm) doped with 0,25 wt% MgO.; mixture of SiC powders (particle size 3–4 μm) and MgO (particle size 1–2 μm) in a ratio of 2:1. Burnable additives is used as ammonium bicarbonate $(NH4)_2CO_3$. Samples in the form of cross members 60x15x5,5 mm size was obtained by one-axial semidry pressing at the pressure of 100 MPa, which was fired in air at temperatures of 1450 to 1550 °C. The flexural strength of the sintered samples with burnable additives showed from 9,5 to 45,3 MPa, an open porosity of 35 to 55%. Samples promising for filter substrates and ceramic membranes.

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Article 5

Koshelev I. I., Bubenkov I. A., Shvetsov A. A., Bardin N. G., Sorokin O. Yu., Makarov N. A. Siliconized graphite: physico-chemical basis of production and prospects of development. Part 1. Main physic-chemical processes occurring at siliconazing.

Koshelev I. I., Doctor of Technical Sciences, *Bubenkov I. A.* (i.bubnenkov@mail.ru), Doctor of Technical Sciences, *Shvetsov A. A.,* engineer, *Bardin N. G.,* engineer, JSC «Scientific research Institute of structural materials based on graphite «Niigrafit», Moscow; *Sorokin O. Yu.,* Candidate of Technical Sciences, FSUE «All-Russian scientific research Institute of aviation materials», Moscow; *Makarov N. A.,* Doctor of Technical Sciences, prof., D. Mendeleev University of Chemical Technology of Russia, Moscow.

Key words: siliconized graphite, composite, structural material, graphite, silicon carbide

Abstract

It is shown that, the simultaneous occurrence of unsteady physicochemical processes, as well as their velocity, do not allow for detailed description of the siliconization of porous carbon materials. Therefore, it is necessary to develop empirical models of the liquid silicon infiltration (LSI) process with the aim to verify existing theoretical dependencies of the every single stage of the process.

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