

possible to estimate contributions of various fluctuations into light scattering by glasses separately. Comparison of RMBS and SAXS data showed that dimensions of Rayleigh scattering species lies in nanometer range.

Results of RMBS and US study of alkali silicate glasses doped with heavy metal oxides evidenced that concentration fluctuations of glass host are "decorated" by dopants due to their segregation into alkali-enriched glass areas. It opens the way to elaboration of glasses for optics, optoelectronics, etc. with pre-designed nanoinhomogeneity.

Results of temperature dependencies of elastic parameters of glasses open the way to designing of glasses characterizing by zero temperature coefficient of elastic modules (so-called "isopausal" glasses for e.g. acoustic delay lines).

THE EVALUATION OF ILLITE/KAOLINITE CLAY SUBMICROMETER PARTICULATE MATERIALS FOR THE DEVELOPMENT OF GEOPOLYMER TYPE SOLIDS

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Geopolymers or alkali-activated binders could be defined in accordance with the chemical composition of raw materials used for preparation: alkali-activated binder on the fly ash basis (blast furnace slag, rice husk), alkali-activated binder on the metakaolin basis [1]. Alternative procedure of geopolymer synthesis which does not require activation by alkaline silicate solution is based on the preparation of active geopolymer precursor by direct calculations of low-quality kaolin with Na/K hydroxides [2]. However, suitability of clay resources for the production of alkali-activated binders is restricted by the variability of clay composition of „normal clays” [3].

The main object of the present research is to evaluate the usability of relatively low kaolinite content containing illite-kaolinite clays for the development of geopolymer type solids.

The illite/kaolinite <1 μm size fraction was obtained both from „grey” and „red” industrially homogenized intermediate clay masses supplied by the Joint Stock Company „Lode” using fractionalization by gravitational sedimentation method. Alkali-activated binders were prepared both from dehydrated (750°C) and thermally not treated illite/kaolinite clay fractions. Clays were activated with 4 mol/l NaOH (or KOH) solution. The solution/solid ratio was 1-2 providing a good workability of the binder paste. The paste was placed into plastic forms and treated 72 h at 60 °C and 24 (or 72 h) at 100°C. Dry samples were used for compressive strength determination.

The illite/kaolinite clay fractions and obtained alkali-activated binders were characterized by means of classical chemical analysis, X-ray diffraction, atomic force microscopy, Fourier transform infrared spectroscopy (FTIR) and scanning electron microscopy.

X-ray diffraction and FTIR analysis results testify the formation of geopolymer phase in alkali activated illite/kaolinite <1 μm size clay fraction obtained by gravitational sedimentation method. Compressive strength of NaOH activated, thermally not treated illite/kaolinite clay fractions after treatment during 72 h at 100°C reaches 32 Mpa.

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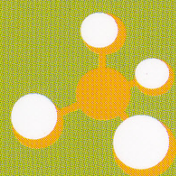
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SPARK PLASMA SINTERING OF SIALON NANOPOWDERS

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The ceramic materials on the basis of Si₃N₄ including SIALONS are characteristic with outstanding mechanical properties (hardness, bending



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