

CONTENS

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COMPOSITE CERAMICS BASED ON HEXAGONAL BORON NITRIDE 5

A study aimed at the development of boron nitride based composites in the BN-Al₂O₃-SiO₂-Si₃N₄ system by using the method of reaction hot pressing has been conducted. Results of the experimental evaluation of mechanical properties of boron nitride based composites containing sialon, in a temperature range of 20 - 1500 °C are presented. The formation of liquid phase and occurrence of chemical reaction during the hot pressing were found to contribute to the achievement of high density of the composites and improvement of their mechanical properties (p. 5-12; fig. 5).

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INVESTIGATION OF THERMOPHYSICAL CHARACTERISTICS OF COMPOSITE
MATERIALS BASED ON PHENILON C-2 FILLED WITH FULLERENE 13

Thermophysical characteristics (specific heat, coefficient of heat conductivity, thermal diffusivity and coefficient of thermal linear expansion) of polymer composite materials based on aromatic polyamide phenilon C-2 filled with fullerene C₆₀ has been studied. A composite material containing 1.5 mass % of fullerene has been shown to possess the best set of thermophysical properties.(p. 13-19; fig. 4).

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FEATURES OF THE PROCESS OF HYDROGENATION AT THE MECHANO-CHEMICAL
TREATMENT OF MG AND TI POWDERS 20

Based on reaction milling in a planetary mill under an excess pressure of hydrogen the nanostructured hydride products Mg_yTi_(100-y)H_x were synthesized starting from powder mixtures of Mg and Ti, (y = 50 ÷ 90). Using theoretical estimates, both X-ray diffraction and high resolution scanning electron microscopy measurements have revealed that during the synthesis was almost the maximum degree of refinement of the product (crystallite size was 8-9 nm), which provided the yield of the hydrogenation process at a temperature of about 45 °C. The introduction of Ti in the reaction volume leads to an improvement of sorption properties of the synthesized product owing to the formation of a multiphase structure consisting of three phases: γ and β MgH₂ and cubic phase based on TiH₂, as well as increased cell volume of β-MgH₂ hydride. Products of the reaction milling of Mg₆₀Ti₄₀ mixture have a minimum temperature of the beginning of decomposition equal to 230 °C, as well as demonstrate high efficiency of the cycle, ~ 85%, which are associated with a maximum capacity of the unit cell of β-MgH₂, synthesized in this case. Reaction product Mg₇₀Ti₃₀H_x with high stability of the cycle (without loss of capacity of hydrogen) showed accelerated kinetics in cycling compared with magnesium hydride.(p. 20-42; fig. 12).

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