

Determination of the impurity composition of the B-N-Al-Ti compound materials obtained under the action of high pressures and temperatures

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Composite materials based on cubic boron nitride in titanium and aluminum containing systems are promising for use in the manufacturing industry to process the cutting part of the tools. In addition, due to a combination of unique characteristics, composition materials based on dense modifications of boron nitride are widely used as various functional environments of modern micro-, nanoelectronics.

Samples of composite materials were synthesized at the SSPA "Scientific-Practical Materials Research Centre of NAS of Belarus" from components AlN, Al, BN and TiN at a pressure of 5 GPa and at different temperatures from 500 °C up to 2000 °C in tungsten and cobalt carbides high-pressure chambers of the "anvil with a hole" type in containers made of lithographic stone. The duration of the synthesis for all samples was 3 minutes.

69 samples were subjected to neutron activation analysis. Due to the fact that the amount of material provided to the NAA was limited, irradiation was carried out in few stages. The concentrations of 43 elements were determined (Na, Mg, Al, Si, Cl, S, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Br, Rb, Sr, Zr, Mo, Sn, Sb, I, Cs, Ba, La, Ce, Nd, Sm, Eu, Tb, Dy, Yb, Hf, Ta, W, Au, Th, U). The analysis allowed to determine the impurities in the raw materials and synthesized samples.

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