nificantly decreases the efficiency of leaching as a result of diffusion problems in sediment layer at the bottom of reaction vessel.

Thus, in order to achieve the maximum leaching rate of copper, the multi-stage process of copper leaching is proposed. Currently, it consists of three stages with arising reaction time on each stage (60, 180 and 600 minutes, respectively).

Results of three-stage leaching are provided in Table 1. Concentration of metal copper in $Cu[(NH_3)_4](OH)_2$ solution is 30 g. per liter, initial concentration of copper in polymetallic concentrate is 350 mg/g, reaction temperature is 25 °C, solid-liquid ratio is 1 : 10.

As it seen from Table 1, it was able to transform about 99.2% of initial amount of copper after three stages of leaching.

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INFLUENCE OF DISPERSION OF INITIAL MIXTURE ON ALUMINUM OXYNITRIDE YIELD

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AlON (γ-aluminum oxynitride) is a hard transparent ceramic material. Like many other ceramics, it has a good thermal and chemical stability. Previous studies have indicated that the AlON is stable between 60 and 73 mol% of Al_2O_3 for all temperatures between 1750 °C and 2000 °C [1].

Amorphous aluminum oxynitride (AlON) possesses unique properties of high dielectric strength, high resistivity, low loss, high decomposition temperature, chemical inertness, and high thermal conductivity. The main aim of the current research is to study the influence of dispersion of the initial mixture on the yield of AlON. In view of the interesting optical, chemical and mechanical properties, aluminum oxynitride spinel (AlON) has potential application as a high-performance structural ceramics and advanced refractory. In addition, it has been processed into fully dense transparent material, and it shows promising mechanical and optical properties suitable to use in infrared and visible window applications

One of the main conditions for a more complete synthesis of the process is the achievement of the maximum possible contact area between the particles of raw materials [2]. To achieve the full density of arrangement, we used alumina micron powder with aluminum nitride nanopowder (composition 1). To compare the effectiveness of micro- and nano-sized powder a mixture of powders of micron aluminum oxide and nitride was composed (composition 2). Processing of optically transparent AlON is more difficult than the synthesis of opaque single phase AlON, because the material must be fully dense, pure, and free of any secondary phases. There are several methods of getting transparent ceramics: simple reaction of Al_2O_3 and AlN, carbothermal reduction of Al_2O_3, plasma arc synthesis, and self-propagating high-temperature synthesis (SHS) [3]. In our investigation we used the first method, which consisting of some characteristic stages, such as: mixing powders, drying the powder, filling a mold, sintering the blank at high temperature for an extended time.

In this research Al_2O_3 Almatis (made in Germany) was used, which presenting white powder with a bulk density of 0.996 gm/cc. The second major component aluminum nitride AlN various dispersion was used. Pour density AlN-nano was 0.142 gm/cc and 0.776 AlN-micro gm/cc.

To study the synthesis of oxynitride phase tablets with a diameter of 30 mm and a height of 3–4 mm were molded, we used compacting pressure of 7 tons. Polyvinyl butyral is used as the binder component in an amount providing sufficient strength of the molded tablets. The first firing was carried out at 1750 and 1850 °C temperature and held at max-

imum temperature for 3 hours. At the output of the first stage there was turned opaque, but tablets were enough strong.

During the firing process occurs baking samples, accompanied by a change, specifically the size reduction of the samples. It was found that a composition 1 was sintered more rapidly than the composition 2. In this case, at all temperatures firing linear shrinkage of composition 1 in 3 times is more than shrinkage of composition 2. Using the nanopowder in the composition 1 resulted more dense samples.

XRD analysis of the test samples showed that, at any temperature of firing there are peaks of the synthesized aluminum oxynitride and aluminum nitride in samples of various compositions.

And with increasing firing temperature intensity of the peaks of aluminum oxynitride $Al_{23}O_{27}N_5$ increases, which indicates an increase in the number of its synthesized blends. It was found that the use of aluminum nitride nanopowder promoted the formation $Al_{23}O_{27}N_5$ at lower temperatures, as at 1750 °C aluminum oxynitride was the main phase of the X-ray. In the case of mixture 2 (micron powders of aluminum oxide and nitride) were used at a temperature of 1750 °C firing on radiographs AlN. is the main phase.

The increasing of the synthesis temperature to 1850 °C causes an intensification of the synthesis of oxynitride for the composition 1 and 2. Therefore, the research showed the efficiency of the use of powders with different particle sizes in the process of synthesis of aluminum oxynitride.

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OPTIMIZATION OF SYNTHESIS PROCESS OF N-CARBOXYMETHYL MALEAMIC ACIDS

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The entire modern development of humanity is inextricably connected with the development of polymer industry – the creation of new and development of existing polymers, creation of products with new properties. An urgent problem is production of maleamic acid, since these substances are necessary for the development of new polymeric materials as intermediate products. Derivatives of dicyclopentadiene is one of the popular types of monomers to produce new structural materials. Since Dicyclopentadiene is of high reactivity, it is used to produce a wide range of synthetic products. N-substituted maleimides are of the greatest interest as they contain different functional groups in their structure.

The raw material for norbornene-dicarboximide are dicyclopentadiene and N-carboxymethyl maleamic acid.

The scheme of this process is shown in the first

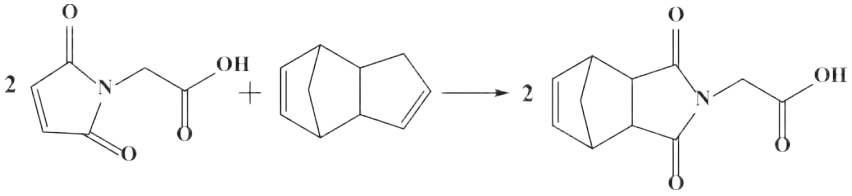

Fig. 1. *Reaction scheme preparation of 5-norbornene-2,3-dihydroxy glycine*