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# ELECTRON MICROSCOPIC ANALYSIS OF DRY PLASTER MIXTURES

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**Abstract.** The article presents the analysis of microscopic analysis of gypsum-based dry construction mixture.

**Keywords.** Dry building mixes, gypsum, electron microscope.

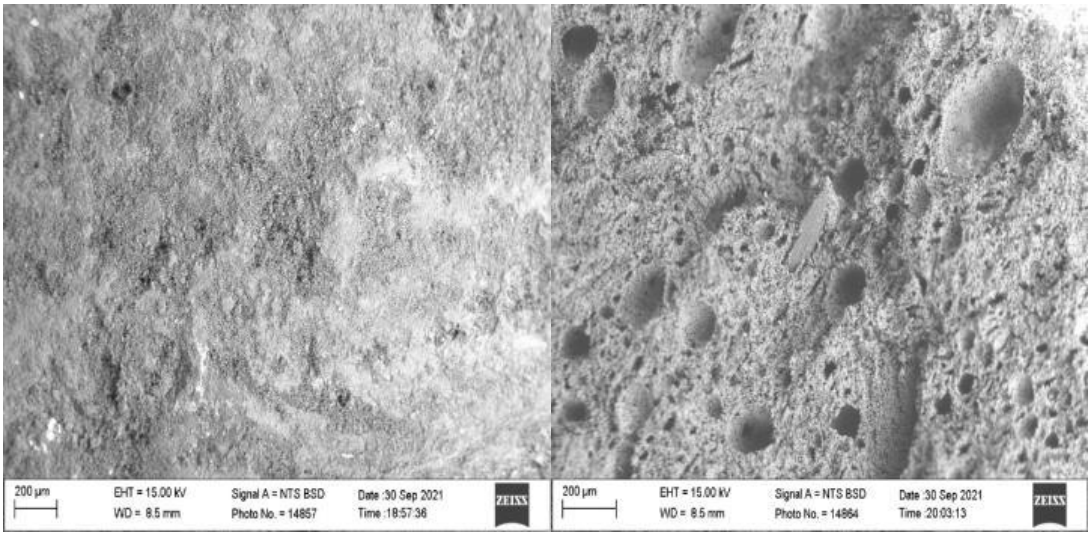
In the world, scientific researches aimed at localization of raw materials, in addition to the quality indicators of raw materials used for the development of new types of dry construction mixes, are being carried out. In this direction, among other things, research on optimization of the amounts of fillers and chemical additives added in the production of gypsum-based dry construction plaster mixtures, substantiation of the capabilities of local additives that act as chemical additives is considered a priority. Decree of the President of the Republic of Uzbekistan No. PF-60 of January 28, 2022 "On the Strategy for the Development of New Uzbekistan in 2022-2026", Decree of the President of the Republic of Uzbekistan No. PQ-4335 of May 23, 2019 "Additional measures for the rapid development of the construction materials industry relevant duties are specified in the decision. [1]

Modern methods of physico-chemical research of dry construction plaster mixtures were used. Electron microscope EVO MA10 (Sarl Zeiss, Germany) was used for microscopic analysis. Fig. 1. Scanning electron microscope (SEM) - the morphology of sorbents and the complex compounds formed by them, as well as the composition of elements were determined using SEM - scanning electron microscope at the "Center of Advanced Technologies".


Figure 1. EVO MA10 electron microscope overview

With the help of an electron microscope, the following can be studied in the field of construction materials: the structure and dimensions of individual submicroscopic crystals, the processes of formation and destruction of crystals; processes at the boundary of particles, the mechanism of deformation and failure, and h. k. The macro- and microstructure of building materials is studied, which makes it possible to make accurate conclusions about the material [3-9]. Dry construction mixture based on gypsum intended for plastering was studied by observing the changes in the structures by the method of electron microscopy. The obtained results are presented in Figure 2.

As a result of electron microscopic analysis, it is observed that there are few micropores in the internal structure of the sample containing simple additives. It was found that the internal structure of the sample with 5% organic additive has micro- and macro-closed pores, the dimensions of the insert are 281.3 μm in length, 83.40 μm in thickness, and the diameter of the largest pore is around 388.5 μm. Assumptions that the adhesion of the additives with the gypsum microbinder in the contact zones leads to an increase in the strength of the mixture are confirmed. A sample of gypsum-based dry construction plaster mixed with 2% of organic additives is taken from the electron microscope image 6 of Figure 1 due to the presence of organic additives in the composition: the length is 383.0 μm, the thickness is 7.218 μm, and the pore diameter is 217 μm. . An increase in the amount of additives, in turn, creates a large number of macro- and micro-sized pores in the composition of the mixture, and if they are added in limited amounts, it is also shown that it has a positive effect on the physical-mechanical and operational properties of the gypsum-based dry construction plaster mixture.

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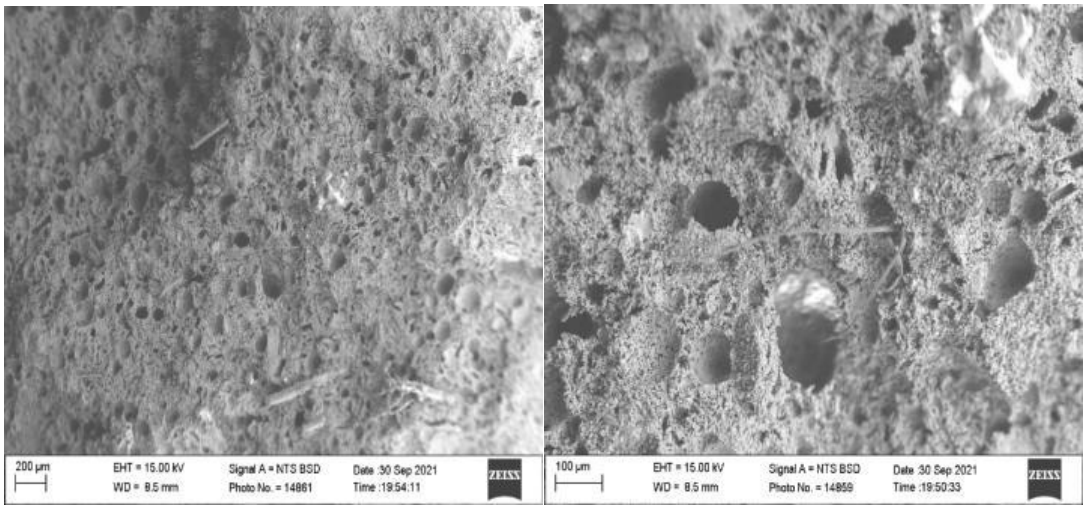


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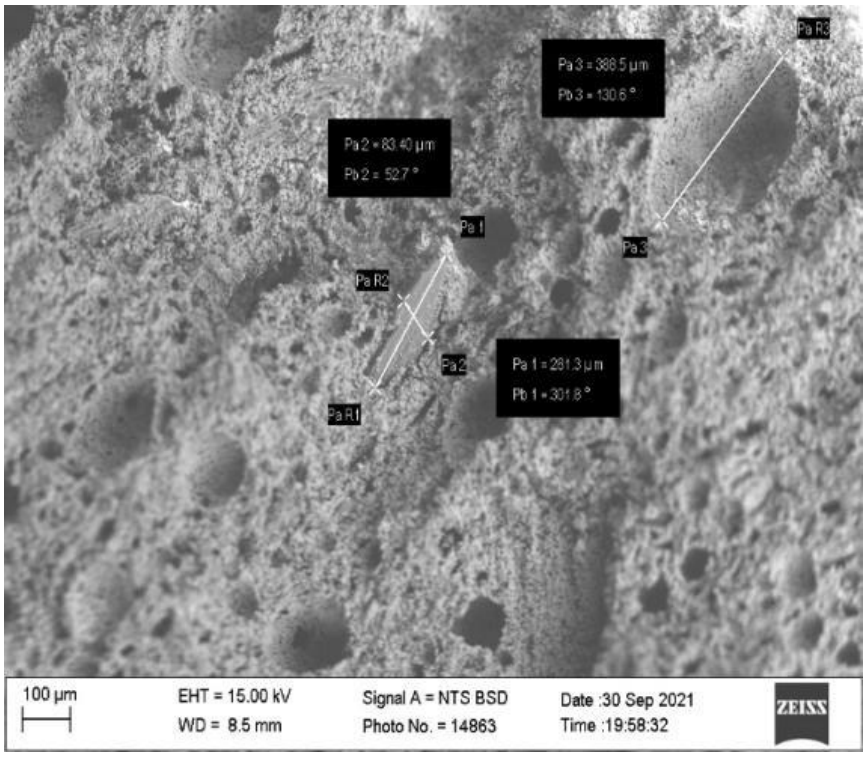


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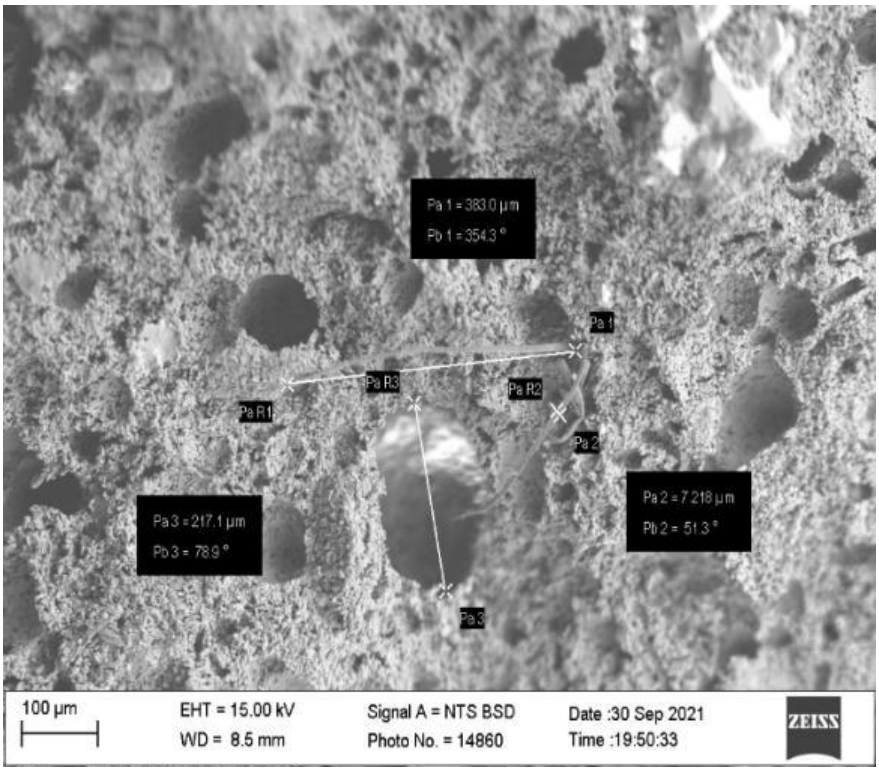


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**Figure 2.** Magnified electron microscope view of gypsum-based dry construction plaster admixtures with 2% and 5% organic additives

1- control composition with organic addition;

2- 2% organic additive content increased by 200 µm; The composition with

3-5% organic additives is increased by 200 µm; The content with

4-5% organic additives is increased by 100 μm;

5-2% organic additive content is enlarged to 100 μm and the sizes of the pores formed by the additives are shown;

6-5% organic additive content magnified at 100 μm, sizes of inclusions and resulting pores are shown.

**Table 1. Total amounts of chemical elements**

| The amount of organic additives,% | Amounts of chemical elements,% | | | | 7-day strength indicator, MPa |
|---|---|---|---|---|---|
| | C | O | S | Ca | |
| 0 | 1,97 | 51,71 | 19,20 | 26,41 | 6,9 |
| 2 | 7,44 | 55,52 | 16,06 | 20,93 | 7,3 |
| 5 | 9,94 | 53,96 | 15,36 | 20,74 | 7,0 |

As can be seen from the given table 1, with the addition of wood flour to the samples and the increase in their amount, carbon content increased from 1.97% to 9.94% due to the added cellulose. For this reason, it was found that the amounts of other constituent chemical elements Sa, S and S decrease accordingly. As a result of the compositional changes, the strength indicators of dry construction plaster mixes are observed to increase from 6.9 MPa to 7.3 MPa.

**Conclusion**

Physico-mechanical and operational properties of gypsum-based dry construction plaster mixture were positively affected by the use of fibrous plant and wood shavings, and this showed that it is possible to expand the use of renewable additives and conduct a lot of research.

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