8. Илиев Х.М., Камалов А.Б., Турсынбаев С.А. Кремний с нанокластерами атомов марганца – новый материал для тензодатчиков. // Наука и общество. 2020, №4 -С.7-9

9. Kamalov A.B., Tursinbaev S.A., Iliyev Kh.M., Shoabdurakhimova M.M. Influence of lighting on tenso-sensitivity of silicon doped with manganese. Scientific-technical journal. 2020. V.3, №5. -P. 45-47

10. Muratov A.S., Kamalov A.B., Tursinbaev S.A. Installations for studying the strain properties of silicon with nanoclusters of impurity atoms. // Science and Education in Karakalpakstan. 2021. №2 (17). С. 4-7.

РЕЗЮМЕ. Оддий яримўтказгич материаллардан фарқли равишда марганец атомлари нанокластерларига эга бўлган кремнийда хона ҳароратида етарлича юқори тензосезувчанлиги кузатилади, буни мавжуд назария билан тушунтириш қийин. Олинган материалларни юқори тензосезувчанлиги босим таъсирида марганец атомларининг нанокластерлари ҳолатининг ўзгариши билан боғлиқдир. Ушбу маълумотлар шуни кўрсатадики, марганец атомлари нанокластерларига эга кремний янги синф датчикларини яратиш учун истиқболли материал бўлиб хизмат қилиши мумкин. Марганец атомларининг нанокластерларининг консентрацияси ва заряд ҳолатини назорат қилиш орқали олинган материалнинг деформацияга сезгирлигини ўзгартириш мумкин.

РЕЗЮМЕ. Установлено, что в отличии от обычных полупроводниковых материалов, в кремнии с нанокластерами атомов марганца наблюдается достаточно высокая тензочувствительность при комнатной температуре, которую трудно объяснить существующей теорией. Высокая тензочувствительность в полученном материале связана с изменением состояния нанокластеров атомов марганца при наличии давления. Эти данные показывают, что кремний с нанокластерами атомов марганца может служить перспективным материалом для создания нового класса тензодатчиков. Управляя концентрацией и зарядовым состоянием нанокластеров атомов марганца можно изменять тензочувствительность полученного материала.

SUMMARY. It was found that, in contrast to conventional semiconductor materials, silicon with nanoclusters of manganese atoms exhibits a high tens sensitivity at room temperature, which is difficult to explain by the existing theory. The high tens sensitivity in the obtained material is associated with the changing of state of nanoclusters of manganese atoms in the presence of pressure. These data show that silicon with nanoclusters of manganese atoms can serve as a promising material for creating a new class of strain gauges. By controlling the concentration and charge state of nanoclusters of manganese atoms, one can change the tens sensitivity of the obtained material.

NEW RAW MATERIALS RECOMMENDED FOR USE IN CEMENT PLANTS OF KARAKALPAKSTAN

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Tayanch so‘zlar: ohaktosh, gabbroid jinsi, jigarrang temir rudasi, qumtepa qumi, kimyoviy tarkibi, portlend sement klinkeri, portlendtsement.

Ключевые слова: известняк, габброидная порода, бурый железняк, барханный песок, химический состав, портландцементный клинкер, портландцемент.

Key words: limestone, gabbroic rock, brown ironstone, dune sand, chemical composition, portland cement clinker, portland cement.

Introduction. The northernmost territory of Uzbekistan - the Republic of Karakalpakstan, which occupies a vast territory, is characterized by a variety of climatic and geographical conditions. Due to the drying up of the Aral Sea, the region is characterized by high salinity of soil and subsurface water. Taking into account the above-mentioned factors in this region it is advisable to use building materials that are resistant to mineral salts and climatic fluctuations. This region is located far enough from the main producers of cement in Uzbekistan, so due to high transportation costs its price rises sharply. The emergence of new local producers will eliminate this transport surcharge, which will make cement more affordable and cheaper [1-3].

Materials and research methodology. The objects of the study were averaged samples of limestone field "Dusshebulak" gabbroid rock area “Sheikhdzhalil" dune sand “Muynak” and brown ironstone area "Hudzhakul". Chemical compositions of raw materials were defined according to the GOST 5382-91 "Blocks of cement and materials for cement production. Methods of chemical analysis" [4]. Evaluation of their suitability for the production of clinker was carried out according to O'z DSt 2950:2015 "Raw materials for the production of Portland cement clinker. Technical conditions" [5].

Results and discussion. With the purpose of a preliminary study of the raw material base in the Karakalpakstan region, limestone, gabbroic, dune sand, and brown iron were sampled from different areas of raw material occurrence. The chemical and mineralogical compositions of technological samples of limestone of the field "Dusshebulak" the gabbroid rock of the site "Sheikhdjelil", dune sand "Muynak", and brown iron of the site "Hujakul" were determined [2, 4]. The results of the chemical analysis of samples of raw components in the Republic of K arakalpakstan are shown in Table 1.

Table 1. Chemical composition of samples of raw materials of the Republic of Karakalpakstan (in terms of 100%)

№	Sample names	count	SiO_2	$A1_2O_3$	Fe_2O_3	CaO	MgO	SO_3	Na_2O	K_2O	Σ
1	Technological sample of limestone Dusshebulak deposit	42,84	3,50	2,48	2,05	48,01	1,12	-	-	-	100
2	Technological sample of greenish gabbro of Sheikhdjeli site	4,92	47,14	19,62	9,67	11,49	2,54	1,11	1,27	1,24	100
3	Technological sample of brown glandular rock "Hujakul"	17,17	37,02	6,56	16,94	14,61	2,51	2,19	1,55	1,45	100
4	Dune sand from Muynak deposit	6,00	84,68	2,75	1,55	-	1,6	0,11	1,68	1,63	100

The content of chloride ion in the gabbroidal rock sample is 0.96 %.

In addition, according to a special methodology it was determined that the melting temperature range of the gabbroidal rock sample is (1190-1200)0C.

The chemical composition of the studied raw components corresponds to the regulation O'z DSt 2950:2015 "Raw materials for the production of Portland cement clinker. Technical conditions"[5].

Carbonate raw materials used in the production of portland cement clinker, the chemical composition must meet the requirements given in Table 2.

Table 2 - Requirements O'z DSt 2950:2015 (paragraph 5.1.3) for the chemical composition of carbonate raw materials for the production of Portland cement clinker

Name of the indicators	Value of the indicator	Limestone of Dusshebulak deposit
Mass fraction of calcium oxide (CaO), %, not less	45,0	48,01
Mass fraction of magnesium oxide (MgO), %, no more	4,0	1,12
Mass fraction of phosphorus oxide (P2O5), %, no more	0,4	-
Mass fraction of alkali oxides (Na2O+0.658K2O), %, no more	1,0	-
Mass fraction of sulfuric acid anhydride (SO3), %, no more	1,5	-

Magmatic rocks are the ultimate products of magmatic activity caused by global and irregular heat and mass transfer from the mantle to the planet's surface. Magmatic melts originate in the lower crust and mantle due to decreasing pressure and increasing temperature. Being less dense in relation to the host formations, they tend to "float" to the surface. In the process of ascent, magma differentiation occurs, which leads to the observed diversity of magmatic rock compositions. In case of reaching the surface the melt is erupted by effusive or explosive mechanism [6].

Several genetic series of magmatic rocks are distinguished, the composition of which evolves from the ancestral deep magma separating from the solid phase of the mantle and deep crust [7].

The chemical composition of eruptive rocks which include gabbro as an aluminosilicate component and lignite as an iron component meet the requirements of O'z DSt 2950:2015, given in Table 3.

Table 3 - Requirements O'z DSt 2950:2015 (paragraph 5.1.8) for the chemical composition of eruptive rocks for the production of portland cement clinker

Name of indicators	Value of the indicator	Gabbrock rock of the Sheikhjeli section
Silicon oxide (SiO2) content, %, not less	38,0	47,14
Aluminum oxide (Al2O3) content, %, not less	8,0	19,62
Magnesium oxide (MgO) content, %, max	10,0	2,54
Sulfuric acid anhydride (SO3) content, %, max	2,5	1,11
Alkali oxides content (Na2O+0.658K2O), %, max	6,0	2,51

Aluminosilicate raw materials which is proposed to use dune sand in the production of portland cement clinker, the chemical composition corresponds to the requirements of O'z DSt 2950:2015, given in Table 3.

In comparison with the data given in Tables 2-3 with the results of the chemical composition of the studied raw materials, it was found that the content of the regulated oxides technological samples of limestone Dushebulak field (CaO = 48,01; MgO=1.12; SO3=0.0; R2O=0.0) %, gabbroid pore of the Sheikhdjeli site (SiO2=47.14; Al2O3=19.62; MgO=2.54; SO3=1.11; R2O=2.51) %, brown ironstone and dune sand fully comply with O'z DSt 2950: 2015.

Based on the studies of the tested raw materials, the compositions of raw mixes and clinkers were calculated for the production of general construction and sulfate-resistant cements [8].

Using raw mixes of optimal compositions (two-component: limestone + gabbroic rock; three-component: limestone + gabbroic rock + brown ironstone; four-component: limestone + gabbroic rock + brown ironstone + dune sand) experimental clinkers for general building and sulfate resistant cements were synthesized and chemical and mineralogical compositions of clinkers were determined.

Conclusion. New compositions were elaborated based on the results of research, previously not studied deposits of raw materials of Karakalpakstan for suitability for the production of portland cement clinker with subsequent development of technology for the production of portland cement from them shows that it is an effective solution to the localization program, by eliminating the problem of cement shortages in the region and covering the needs of the construction industry of the Republic of Karakalpakstan.

References

1. Kudainazarova D.K. Strategic aspects of the implementation of production opportunities of the Republic of Karakalpakstan on the basis of local raw materials. // Bulletin of KCO AS RUz. 2012. № 1.- P. 76-78.
2. Aimbetov N.K. The role of small business and entrepreneurship in the development of industrial production in Karakalpakstan // Bulletin of KCO AS RUz. 2012. № 1.- P. 72-76.
3. Mineral raw material based on construction materials of the Uzbek SSR. Reference book. -Tashkent: "Fan". 1967. –P. 600.
4. GOST 5382-91 "Cements and materials of cement production. Methods of chemical analysis.
5. O'z DSt 2950:2015 Materials of raw materials for the production of portland cement clinker. Technical specifications.
6. Prothero, Donald R.; Schwab, Fred. Sedimentary geology: an introduction to sedimentary rocks and stratigraphy. 2nd. - New York: «Freeman», 2004. - P. 12. ISBN 978-0-7167-3905-0.
7. effusive rocks // Great Soviet Encyclopedia: [in 30 volumes]. edited by A. M. Prokhorov. 3rd ed. - M.: Soviet Encyclopedia, 1969-1978.
8. Orazimbetova G.J., Ubbiniyazova L.K., Nemchik A.G., Reymov A.M. New raw materials recommended for application at cement plants of Karakalpakstan. /Science and education in Karakalpakstan, №/2(23), 2022, ISSN 2181-9203, -P.45-48.

РЕЗЮМЕ. Мақолада “Дусшебулоқ” оҳактошлари, “Шайхджелил” габброид жинси, “Мўйноқ” конининг қумтепа қуми ва “Хўжакул” кўнғир темирли жинсларининг технологик намуналарини меъёрий талабларга мувофиқлигини аниқлаш мақсадида кимёвий таркибини ўрганиш натижалари келтирилган. Уз ДСт 2950:2015 талаблари "Портленд цемент клинкери ишлаб чиқариш учун хом ашё. Техник шартлар” Портленд цемент клинкери ишлаб чиқаришда ишлатиладиган карбонат, алуминосиликат хомашёси ва магматик жинсларнинг кимёвий таркиби.

РЕЗЮМЕ. Приведены результаты изучения химического состава технологических проб известняка «Дусшебулак», габброидной породы «Шейхджелил», барханного песка месторождения «Муйнак» и бурый железистый породы «Худжакул» с целью определения их соответствия требованиям, предъявляемым O’z DSt 2950:2015. Материалы сырьевые для производства портландцементного клинкера. Технические условия» к химическому составу карбонатного, алюмосиликатного сырья и изверженных горных пород, применяемых при производстве портландцементного клинкера.

SUMMARY. It is presented the results of the study of the chemical composition of technological samples of limestone "Dusshebulak", gabbroic rock "Sheikhdjelil", dune sand deposit "Muynak" and brown iron rock "Hujakul" to determine their compliance with the requirements of O'z DSt 2950:2015 "Raw materials for the production of portland cement clinker. Technical conditions" to the chemical composition of carbonate, aluminosilicate raw materials and eruptive rocks used in the production of portland cement clinker.