Project name, IRN	***AP08955736 —*** Development of scientific and technological principles for the creation of fire-proof epoxy composites with increased performance characteristics with the introduction of micro disperse diorite.
Terms of implementation	08.10.2020-30.09.2021
Project supervisor	Bekeshev Amirbek Zarlykovich – Candidate of Physical and Mathematical Sciences, Associate Professor.
Report	Under the scope of this project new polymer composite coatings with improved physical-chemical, mechanical properties and reduced flammability will be created. Deep fundamental knowledge in the influence of nature, morphology of filler particles surface, and mechanisms of flammability reduction, as well as the influence of different physical methods of modification on the structure, physical-chemical and mechanical properties of epoxy coatings will be accumulated. In addition, it is proposed to use as fillers minerals of Aktobe region (such as diorite), which may contribute to the import substitution program.
Purpose	The purpose of this project is to create a prescription for modification of epoxy polymers with the addition of fine diorite, which provides increased physical and chemical, mechanical properties and reduced flammability, obtaining fire-safe epoxy coatings with improved performance.
Expected results	Under the scope of the project new fire-proof polymer composite coatings for wood and metal with improved physical, chemical and mechanical properties will be created. Dispersed diorite, which is a natural resource of Aktobe region, will be used as fillers. ED- 20 epoxy resin plasticized with Fyrolflex containing a combustion inhibitor (phosphorus), capable of structuring the epoxy polymer under the influence of elevated temperatures will be used as polymer matrix. The mechanisms of bonds (chemical and/or physical) formation of between the polymer matrix and reinforcing fillers will be studied; the presence of chemical interaction between functional groups of γ- amino-propyl triethoxysilane, epoxy oligomer and fillers will be established. Efficiency of disperse fillers functionalization providing decrease of their aggregation, polydispersity and uniformity of their distribution in polymer matrix, and also increase of specific surface that simultaneously with participation of amino groups of γ- amino-propyl triethoxysilane in formation of structure in epoxy oligomer curing will provide essential increase of physical and mechanical properties of epoxy composites. Thus, the developed materials can be used to obtain fire-proof wear-resistant coatings on wooden and metal surfaces, including applications in military industry, for example in the painting of parts of housings or containers for the transportation of fire-, explosion-, impregnating and casting units in aviation, shipbuilding and automotive industries, as well as the creation of polymer composites for structural purposes, such as binders in the manufacture of carbon plastics used in the manufacture of fuselages, for example in the manufacture of carbon fiber.

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