

Name of the project: №AP08857439 «Development of new biodegradable film materials based on starch»

Relevance:

The problem of environmental pollution with packaging materials, mainly polyethylene, which are very durable and degrade for more than a hundred years, creates a serious problem for the environment all over the world, of course, this problem also exists in Kazakhstan. In addition, according to the EU Directive (EU 94/62 DSD - Green Mark), the responsibility of the manufacturer (industrial consumer) of the packaging for the life cycle of the packaging introduced by him into circulation on the market is determined. As a member of the WTO, compliance with these requirements and the problem of packaging recycling will face the Republic of Kazakhstan.

The solution to the problem of "polymer waste" is the creation and integration into the economic circulation of materials based on renewable raw materials, capable of biodegradation under appropriate conditions, into components that are harmless to the environment, which is envisaged to be implemented in this project.

Purpose:

The purpose of this study is to develop composite granules based on wheat starch for the production of biodegradable film materials, the use of which will reduce the burden on the environment and improve the ecological situation in the country, as well as reduce import dependence on raw materials for the production of biodegradable bags.

Expected and achieved results:

As a result of the research carried out, there will be:

- 1 article was published in a peer-reviewed foreign scientific journal with a CiteScore percentile in the Scopus database of at least 50, 2 articles in a domestic edition with a non-zero impact factor (recommended by Committee for Control in the Sphere of Education and Science);

- 1 patent application of the Republic of Kazakhstan has been filed;

- 1 technology for the production of biodegradable film material has been developed;

- Pilot - industrial testing of the developed technology was carried out at JV Uly Dala LLP - a manufacturer of biodegradable bags in Nur-Sultan;

- 1 recommendation was developed for the introduction of the technology of composite biodegradable films into production.

So far completed:

- an analysis of existing and developed in the world technologies for the production of biodegradable materials was carried out;

- received and conducted studies of physical and chemical properties (the amount of amylose, lipids, proteins, minerals, morphology, thermodynamic, viscous properties) of A- and B-starch - as raw materials for further processing;

- studies have been carried out on modification (acetylation, propionation, extrusion) of wheat A- and B-starch;

- studies were carried out on plasticization (polyvinyl alcohol, glycerin, etc.) of modified wheat A- and B-starches;

- the optimal compositions and modes of obtaining granules and biodegradable films based on compositions of plasticized starches with PCL - poly- (ϵ -caprolactone) have been determined;

- published 2 articles in a domestic edition with a non-zero impact factor (recommended by KOKSON);

- 1 patent application of the Republic of Kazakhstan has been filed.

List of publications made within the framework of the project:

An article titled «ИССЛЕДОВАНИЯ МОРФОЛОГИИ И ФИЗИКО-ХИМИЧЕСКИХ СВОЙСТВ КРАХМАЛОВ РАЗЛИЧНОГО ПРОИСХОЖДЕНИЯ КАК ОСНОВНОГО СЫРЬЯ ДЛЯ ПРОИЗВОДСТВА БИОРАЗЛАГАЕМЫХ ПЛЕНОЧНЫХ МАТЕРИАЛОВ» has been published by the journal «Доклады НАН РК»

An article titled «INVESTIGATION OF THE EFFECT OF ACETYLATION ON THE PHYSICOCHEMICAL PROPERTIES OF GRAIN STARCHES» has been published by the journal «Вестник Карагандинского университета серия биология, медицина, география»

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Information for potential users:

The introduction of technology for the production of biodegradable film materials will lead to a decrease in the burden on the environment, an improvement in the environmental situation in the country and import dependence on raw materials for the production of biodegradable bags. Recycling agricultural waste into valuable biodegradable materials will lead to import substitution and provide social and economic benefits for Kazakhstan.

Additional Information:

Are there any preparations planned during the implementation of the Project's objectives? PhD dissertations and young scientific personnel will master new research methods on modern equipment.