name of the unit:

BIOPOLYMERS - MODIFICATIONS AND APPLICATIONS

Institute of Polymer and Dye Technolog,
Faculty of Chemistry, Lodz University of Technology

symbol:

I-33

https://chemia.p.lodz.pl/

head of the unit:	potential promoters:	contact person:
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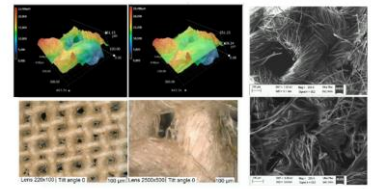
scope of activities:

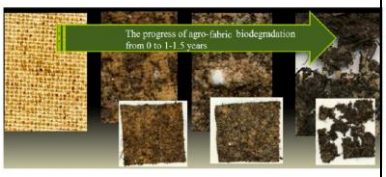
In accordance with the principle of sustainable development and with reference to the applicable national intelligent specializations of KIS, the main areas of interest and directions of the research are:

- Chemical and physical modifications of biopolymers obtained from renewable raw materials. The area includes the development of proteolysis, condensation and addition reaction formulas.

- Designing modern biomaterials and composites, chemical mechanisms of their interactions, developing their recycling methods through controlled decomposition through implementation of the produced biopolymer products into natural and synthetic polymer matrices.

graphic material



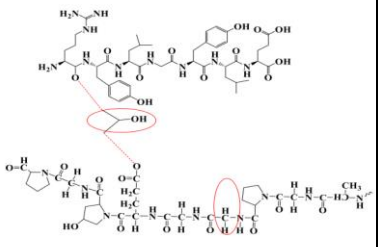


present activities:

Currently, we are focusing on the development of materials with limited flammability, thermally stable, with specific mechanical parameters and compostability for use in seat components for the European railway market.

We conduct research on the production of gel materials with technical properties for applications in the packaging industry. We develop new solutions in the production of biodegradable and bio-decomposable agricultural textiles and textiles for the sector of decorative flowers and edible crops, recreational and sports grasses, covers for the aesthetic development of urban areas, etc. Implemented products for the domestic market (cellulose-elastomeric materials).

We select the conditions and analysis to conduct a controlled decomposition of polymeric materials. Taking into account spectrophotometric and elementary analysis, compostability, ecotoxicity and development of acceptance levels of modular materials for the process of their biodegradation, etc.



Future activities:

Development of new, universal polymer matrix modules in order to obtain prefabricated elements with favorable mechanical properties, intelligent and easy to process in industry.

Keywords:

scleroproteins, keratin, collagens, agricultural textiles, polymer-latex mixtures, biodegradation, compostability

List of internship proposal in this research team:

Prochoń M., Marzec A., Szadkowski B.; "*Preparation and characterization of new environmentally friendly starch-cellulose materials modified with casein or gelatin for agricultural applications, Materials*", 2019,12,1684.

Prochoń M.; "*Effect of modified keratin from renewable sources on composites properties of synthetic isoprene rubber*", Journal of Elastomers and Plastics, 2020, 1, 23.

M. Prochon, Sz. Szczepanik, O. Dzeikala, R. Adamski; "*Biodegradable Composite with Functional Properties containing Biopolymers*", Catalysts, 2022, 12.77.

Prochoń M., Dobrochowska-Witczak M., Biernacka A.; "*Method of producing latex-cellulose agricultural material*" PL234519.

Winner of the competition The Best Idea for a Spin-off Company 2015; Gold medal IWIS2017 Innovation Fair "BioEcoFab - cellulose-elastomer agrotextile"; Silver Medal International Intellectual Property, Invention, Innovation and Technology Exposition IPITEx 2020 (Bangkok, Thailand), "*Thermally Stable Biodegradable Polymer Compositions Packaing*"; EUROINVENT 2020 gold medal, (Jassy, Romania) "*Biodegradable polymeric compositions from renevable resources*"

(1)"*Composite structures with reduced flammability and defined biostatic properties with additives facilitating degradability or compostability*", Application project financed by the National Center for Research and Development, POIR.04.01.04-00-0062 / 20 (2021 - 2023) (2) "*The influence of modified scleroproteins on the cross-linking and stability of biopolymer gels*" Miniatura 4 financed by NCN Dec-2020/04 / X / ST5 / 00869 (2021); (3) "*Thermally stable biodegradable polymer compositions for packaging*" Innovation Incubator 2.0 (2019-2020).

List of attachments:

Collaboration in research tasks related to the specification of physico-chemical parameters of the developed new compositions of polymer gels with improved mechanical and thematic properties.