Project title: **Innovative technologies for valorizing lignocellulosic waste to bioplastics, LIGNOBIOPLAST**
Objectives stage 3. Experimentation and optimization of bioplastics technologies from lignocellulosic waste - final: ►Production of technical documentation of the LIGNOBIOPLAST technology; ►Evaluation of the bioplastics obtained from a technological, economic and environmental (LCA) point of view; ►Dissemination of results (1 ISI article, 1 patent application).

Stage 3 summary.

Phase 3 of the project was carried out over a period of 4.5 months (01.01.2024 -14.05.2024). Three activities were planned: ►**Act 3.1** ***Technical documentation achievement of the LIGNOBIOPLAST method***. The technical documentation - technological file for the two technologies has been realized containing the chapters: name, scope, general presentation, raw materials, auxiliary materials and finished product, equipment, necessary facilities and utilities, technological operations, socio-economic and environmental effects, potential producers/service providers and potential users. ►**Act 3.2.** ***Evaluation of the obtained bioplastics in terms of technological, economic and environmental aspects (LCA)***. For each technology (PLA and PHA) the life cycle was assessed using the professional software SimaPro v 9.0 and applying the Impact2002+ method. Fifteen categories of environmental and human health impacts were identified for the technologies: terrestrial ecotoxicity, terrestrial acidification/nutrition, aquatic acidification, aquatic exotoxicity, aquatic eutrophication, global warming, ozone depletion, non-renewable energy, mineral exploitation, land occupation, respiratory inorganic substances, respiratory organic substances, non-carcinogenic substances, carcinogenic substances. Aquatic ecotoxicity, global warming, ionising radiation, terrestrial ecotoxicity and terrestrial acidification/nutrification are key factors identified for PLA production technology. In the case of PHA technology, the highest contribution to the impact categories is represented by the fermentation stage of the technological process followed by hydrolysis, delignification, pretreatment and purification of PHA. The results obtained show that the highest contribution of the studied method is attributed to the environmental impact category non-renewable energy followed by ionising radiation, aquatic ecotoxicity and terrestrial ecotoxicity. **Act 3.3. Dissemination of results.** The results obtained during the phase were disseminated through: publication of 1 ISI article and 1 patent application.

Results stage 3

►**Articles**

►ISI articles published: 1

1. Lacrimioara Senila, Ioan Botiz, Cecilia Roman, Dorina Simedru, Monica Dan, Irina Kasco, Marin Senila, Otto Todor-Boer, Processing of thin films based on cellulose nanocrystals and biodegradable polymers by space-confined solvent vapor annealing and morphological characteristics. Materials, 2024, 17, 1685. https://doi.org/10.3390/ ma17071685 (Q1, SRI =1.659).

► Patent application submitted to OSIM

1► Patent application no. A00133/26.03.2024, METHOD FOR OBTAINING BIOPLASTIC POLYLACTIC ACID FROM LIGNOCELLULOSE BIOMASS BY MICROWARE FIELD IRRADIATION, authors: Lacrimioara Senila, Oana Cadar, Eniko Maria Kovacs and Anca Becze

►Experimental report: 2

- Report on the technical documentation of PLA and PHA technology
- Report on the assessment of bioplastics from a technological, economic and environmental point of view (LCA).