



Circular economy for biodiversity Unlocking the green potential

*Skills for sustainable,
resilient, and socially
fair communities*

**EUROPEAN
YEAR OF
SKILLS**

Date

June

5



Łukasiewicz
Institute of Heavy
Organic Synthesis
BLACHOWNIA

Marek Warzała

Leader of the

Bioeconomy Research Group

3-11 June 2023

#EUGreenWeek

PARTNER EVENT



Łukasiewicz Research Network – Institute of Heavy Organic Synthesis "Blachownia"



Łukasiewicz
Institute of Heavy
Organic Synthesis
BLACHOWNIA

Research areas

Bioeconomy, including technologies for processing renewable raw materials for the production of liquid biofuels, base lubricating oils, chemicals, fine chemicals, and ecological products.

- **New materials**, including technologies for the preparation, modification and processing of plastics based on polymer materials and testing of their properties and application possibilities, together with resin technologies and modification of their properties.
- **Circular economy**, covering the eco-design phase, production processes, recycling technologies, by-products, post-use and production waste

Research specializations

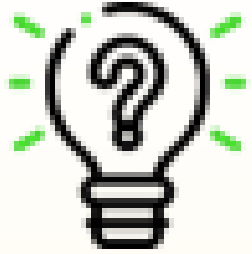
- **Pressure processes**, including hydrogen processes, alkoxylation
- **Catalytic processes**, (homo- and hetero- including ion exchangers and special catalysts)
- **Specialist chemical technologies** – products for various industries.
- **Engineering and technical area**, including the development of project documentation and moving the scale **from laboratory to technical or industrial production.**
- **Analytics and measurements** dedicated industrial manufacturing processes.

Bioeconomy Research Group offer

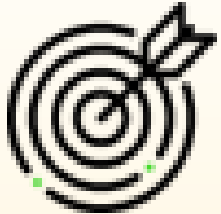
- Processing of renewable raw-materials into products and half-products of industrial chemistry, e.g. additives for polymers and biopolymers, biofuels, coating materials
- Research on management of by-products from biofuel production and products of oleochemical industry,
- Production and application of new generation heterogeneous catalysts (ionic liquids, organic-inorganic catalysts) for processing of vegetable oils and carbohydrates to various products,
- Research on application of crude and modified vegetable oils as ecological base for lubricating agents and other applications,
- Other technologies based on sustainable materials



Research projects examples



Development of an automated processing method, a "Green Box", for production of bio heating oil from waste sources



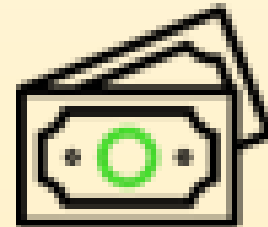
Goal: Production of bio heating oil, using wastes sources in form of fat and grease from food production industry and grease traps as a raw material.



Consortium: AS Green Cube (Coordinator), ASIO spol. s. r.o. - Czech Republic, Malthe Winje Automasjon AS - Norway, Filtersystem Scandinavia AB - Sweden, Teknologisk Institutt AS - Norway, Institute of Heavy Organic Synthesis "Blachownia" - Poland, Labor s.r.l. - Italy

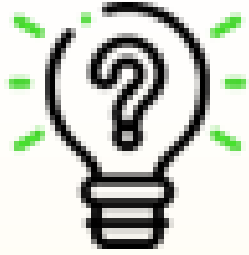


Realisation period:
01.09.2012-31.08.2015

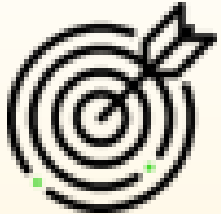


Financed by:
FP7

Research projects examples



Development of tailor-made PHB composites for technical applications PHB2MARKET ERA-IB-16-044



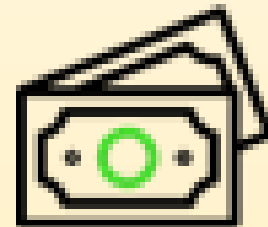
Develop 100 % renewable composites with high added value, build from polyhydroxyalkanoate polymer (PHB), cellulose nanofibers (CNFs) and biobased multifunctional plasticizers (BMPs). Those materials can be created from biomass or industrial wastes, using environmental friendly biotechnical and chemical processes



Fraunhofer Gesellschaft zur Förderung der angewandten Forschung e.V./Germany, Biotrend SA/Portugal, Institute of Biopolymers and Chemical Fibres/Poland, Institute of Heavy Organic Synthesis "Blachownia"/Poland, SILESIA POLYMERS/Poland



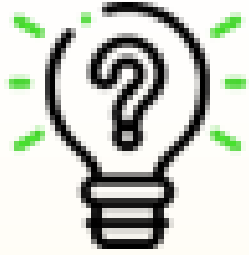
Realisation period:
01.01.2017-31.12.2019



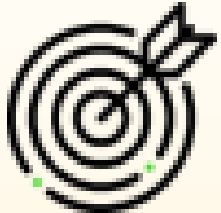
Financed by:

National Centre for Research and Development, Federal Ministry of Education and Research

Research projects examples



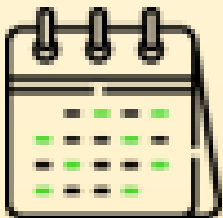
Advanced BIObased polyurethanes and fibres for the autoMOTIVE industry with increased environmental sustainability



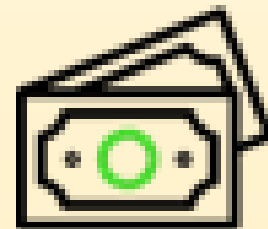
Goal: The BIOMOTIVE project aims to demonstrate, in relevant industrial environments, the production of innovative and advanced bio-based materials (i.e. thermoplastic polyurethanes, thermoset polyurethane foams and regenerated natural fibres) specifically for the automotive industry



Consortium: SELENA LABS Sp. z o.o. (Poland) – project coordination, Maier Scoop (Spain), Metsä Fibre Oy (Finland), Novamont Spa (Italy), Thüringisches Institut Für Textil-Und Kunststoffforschung Rudolstadt (Germany), Sieć Badawcza Łukasiewicz - Instytut Ciepłej Syntezy Organicznej Białostok (Poland), Nadir Srl (Italy), E-Office7 Sp. z o.o. (Poland), Leda Polymer Sp. z o.o. (Poland), I.S.C. Ro Technology Srl (Romania), Intap Tobik Spółka Jawna (Poland), Università Di Pisa (Italy), Patentopolis Bv (Netherlands), Fundacion Cartif (Spain), Uitp - Union Internationale Des Transports Publics (Belgium), Rina Services Spa (Italy)

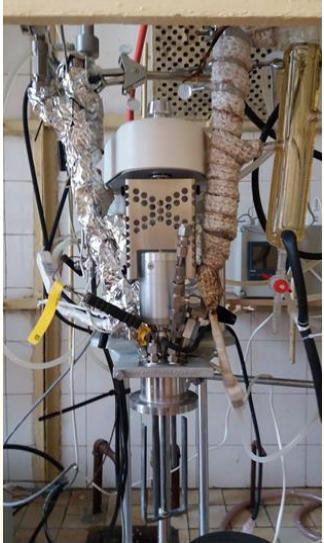


Realisation period:
01.06.2017-31.05.2021



Financed by:
Horizon 2020

Bioeconomy Research Group Infrastructure



Pressure reactor Parr 4560 Series

Acid-proof stainless steel or titanium alloy reactor chamber, max volume **450 cm³**, anchor stirrer, bottom discharge, precise temperature control

High pressure reactor 15 dm³,

Acid-proof stainless steel, (max pressure – 10 bar, max temperature 250 °C), turbine mechanical stirrer, bottom discharge, gas inlet, temperature control, manometer, raw material dosing valve



Glass reactor 15 dm³,

Heating mantle, bottom discharge, PFA-coated mechanical stirrer, spiral reflux with 0,2 m² heat exchange area, temperature sensor

Bioeconomy Research Group Infrastructure



Filtration setup 15 dm³



**Distillation
at reduced pressure
20 dm³**



Possibility to obtain samples weighing 10 kg (one batch)

Selected research infrastructure

Quarter-technical installation of hydrogen processes

Verification of the technological feasibility of hydrogenation processes as well as production of samples necessary for application testing of new products.

The plant is of great importance for developing research and development works and, above all, **for the commercialization of R&D results** in the field of hydrogen technologies.

Thin film evaporators, up to 12 L/h, stainless steel, (max vacuum 2,2 mmHg)



Selected research infrastructure – material testing



**Twin-screw extruder
Thermo Scientific PRISM**



- **Standard Tensile Tester
Instron 4466 with Bluehill2**



**Capillary rheometer
Instron Ceast SR50**

Topic and project idea

- **HORIZON-CL6-2024-ZEROPOLLUTION-02-2-two-stage:** Innovative technologies for zeropollution, zero-waste biorefineries [21 February 2024 / 17 September 2024]
- **HORIZON-JU-CBE-2023-IA-07:** High performance, circular-by design, bio-based composites [20 September 2023]
- **HORIZON-JU-CBE-2023-R-04:** Development of novel, high-performance bio-based polymers and co-polymers [20 September 2023]

We are looking forward to
cooperate with you!

**Sieć Badawcza Łukasiewicz –
Instytut Ciężkiej Syntezy Organicznej
"Blachownia"**
**ul. Energetyków 9, 47-225 Kędzierzyn-
Koźle**

www.icsolukasiewicz.com.pl

marek.warzala@icsolukasiewicz.gov.pl

tel: +48 77 487 3033



Łukasiewicz
ICSO
BLACHOWNIA

