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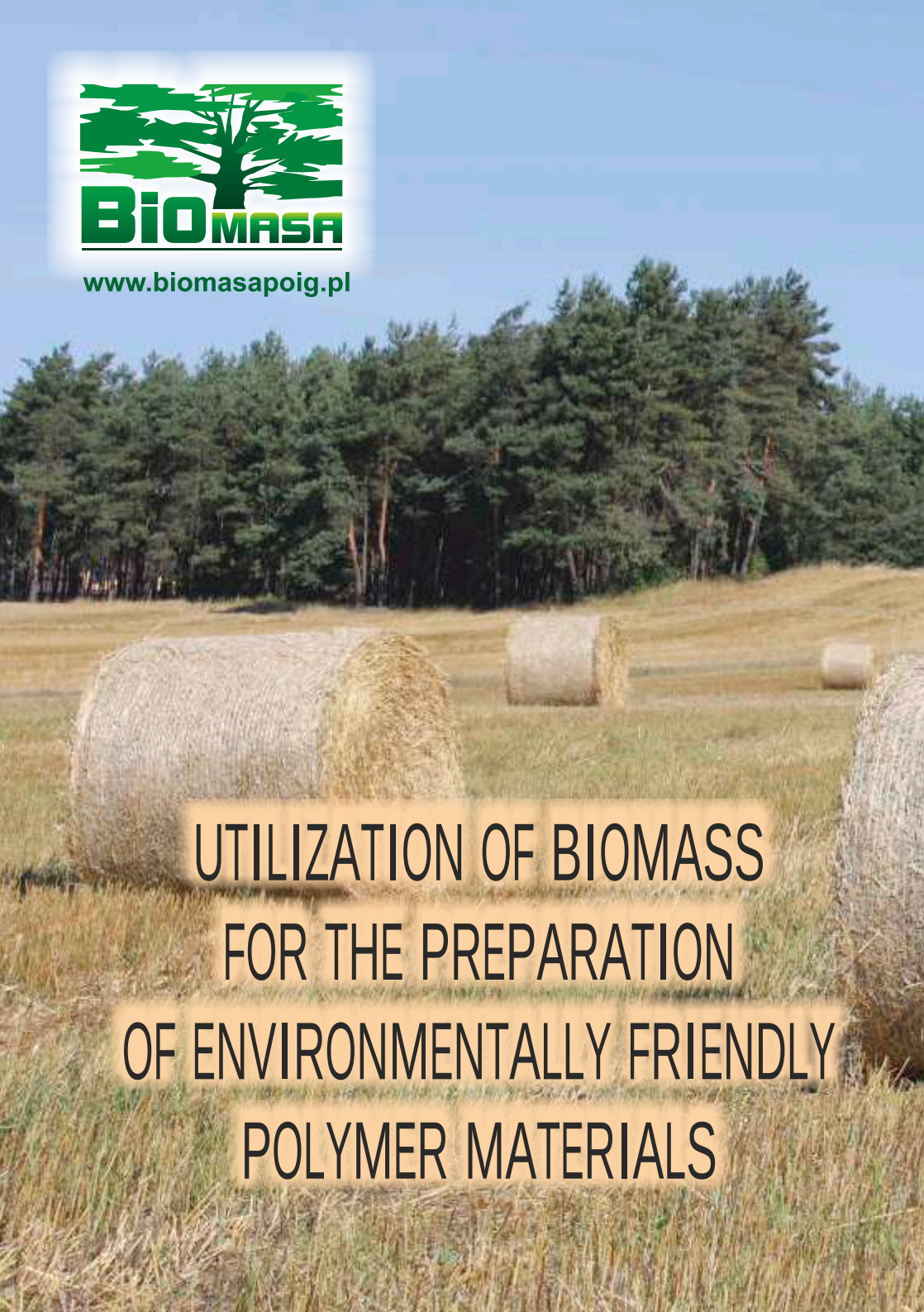

UTILIZATION OF BIOMASS FOR THE PREPARATION OF ENVIRONMENTALLY FRIENDLY POLYMER MATERIALS

UTILIZATION OF BIOMASS FOR THE PREPARATION OF ENVIRONMENTALLY FRIENDLY POLYMER MATERIALS

Innovative Economy Operational Programme 2007-2013
Project PO IG 01.01.02-10-123/09, realized from 01.01.2010 to 30.06.2015

COORDINATION – prof. Andrzej Okruszek, Lodz University of Technology
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The Project was conducted within a frame of Innovative Economy Operational Programme, implemented by European Union in 2007 and partially financed by EU from European Regional Development Fund. The Leader of the Project was Lodz University of Technology. The Consortium realizing the Project combines research groups from Lodz University of Technology, Agricultural University in Cracow, Central Mining Institute in Katowice, Centre of Molecular and Macromolecular Sciences of Polish Academy of Science in Lodz and Institute of Biopolymers and Chemical Fibres in Lodz.
The project was focused on utilization of various kinds of plant biomass and textile waste materials by their transformation with biotechnological methods, involving either enzymatic or microbial processes, into fibrous polymer materials. The intermediate products in those transformations were: cellulose nanofibres, isotactic (L)polylactide and aliphatic-aromatic co-polyesters modified with fatty acid residues. These intermediates thus became important feedstocks for the production of biodegradable fibrous materials as well as other kinds of biodegradable polymer composites. The major target of the project was elaboration of methods of production of the number of polymeric fibrous and composite materials on the basis of feedstocks obtained from various kinds of plant biomass employing biotechnological processes.

In the frame of realization of the project participating research teams elaborated several innovative technologies that can be introduced for industrial implementation. The following products are awaiting potential customers:

1. Preparation of lipolytic enzyme from *Mucor circineloides* and *Mucor racemosus* moulds immobilized in polyurethane foam
Four patents: PL217358, PL217359, PL217360, PL217361 (all dated 03.10.2011)
Inventor: team from the Institute of Technical Biochemistry, Lodz University of Technology (Prof. Tadeusz Antczak, **tadeusz.antczak@p.lodz.pl**)

2. Preparation of multienzyme complex from *Aspergillus niger* mould for refining of plant biomass
Patent application P-398611 (dated 26.03.2012)
Inventor: team from the Institute of Technical Biochemistry, Lodz University of Technology (Prof. Tadeusz Antczak, **tadeusz.antczak@p.lodz.pl**)

3. Preparation of sound absorbing thermoplastic composite from needle punched nonwoven
Patent application P-402974 (dated 04.03.2013)
Inventor: team from the Department of Material and Commodity Sciences and Textile Metrology, Lodz University of Technology (Prof. Izabella Krucińska, **izabella.krucinska@p.lodz.pl**)

4. Preparation of sound absorbing thermoplastic composite with a relief-shaped surface from needle punched nonwoven
Patent application P-402975 (dated 04.03.2013)
Inventor: team from the Department of Material and Commodity Sciences and Textile Metrology, Lodz University of Technology (Prof. Izabella Krucińska, **izabella.krucinska@p.lodz.pl**)

5. Preparation of sound absorbing thermoplastic composite from needle punched nonwoven and straw
Patent application P-409183 (dated18.08.2014)
Inventor: team from the Department of Material and Commodity Sciences and Textile Metrology,
Lodz University of Technology (Prof. Izabella Krucińska, **izabella.krucinska@p.lodz.pl**)

6. Preparation of containers with various degree of biodegrability for agrotechnical applications (plant pots) on the basis of starch and cellulose nanofibers
Patent applications P-408654, P-408656, P-408657 (all dated 25.06.2014)
Inventor: team from the Central Mining Institute in Katowice (Dr Henryk Rydarowski, **h.rydarowski@gig.eu**)

7. Fementative method of preparation of L-lactic acid
Patent application P-411316
Inventor: team from the Institute of Fermentation Technology and Microbiology, Lodz University of Technology (D.Sc. Piotr Walczak, **piotr.walczak@p.lodz.pl**)

8. Application of cellulose nanofibers prepared from plant biomass for reinforcement of polymer composites
Patent applications P-402976 (dated 04.03.2013) and P-408962 (dated (23.07.2014)
Inventor: team from the Institute of Biopolymers and Chemical Fibres in Lodz (D.Sc. Danuta Ciechańska, **dciechan@ibwch.lodz.pl**)

9. Preparation of nonwoven crop covers from aliphatic-aromatic copolyesters modified with dimerized fatty acid esters
Inventor: team from the Institute of Biopolymers and Chemical Fibres in Lodz (D.Sc. Danuta Ciechańska, **dciechan@ibwch.lodz.pl**)

10. Preparation of polylactide nanocomposites with nanochalk
Patent application P-398488 (dated 16.03.2012)
Inventor: team from the Centre of Molecular and Macromolecular Studies, Polish Academy of Sciences in Lodz (Prof. Ewa Piórkowska, **epiorkow@cbmm.lodz.pl**)

11. Innovative method of turfing of difficult terrain – ski slopes
Inventor: team from the Agricultural University in Cracow (Prof. Andrzej Lepiarczyk, **rrlepiar@cyf-kr.edu.pl**)

12. Preparation of cellulose-elastomeric material for application in agriculture
Patent application P-404695 (dated 15.07.2013)
Inventor: team from the Institute of Polymer and Dye Technology, Lodz University of Technology (Prof. Marian Zaborski, **marian.zaborski@p.lodz.pl**)

We wish to encourage all interested parties to contact the coordinator or particular Project contractors in order to obtain more comprehensive information about aforementioned technologies resulting from the Project.

The Consortium research teams represent following institutions:

AGRICULTURAL UNIVERSITY of Cracow

Central Mining Institute in Katowice

Centre of Molecular and Macromolecular Studies in Lodz

Institute of Biopolymers and Chemical Fibres in Lodz

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Lodz University of Technology

Lodz University of Technology is represented by research teams from:

Institute of Fermentation Technology and Microbiology

Departament of Material and Commodity Sciences and Textile Metrology

Institute of Polymer and Dye Technology

Institute of Technical Biochemistry

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The Project is being realized in the time frame 2010 - 2015 within the Innovative Economy Operational Programme
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Priority axis 1. Research and development of modern technologies
Measure 1.1. Support for scientific research for establishment of knowledge-based economy
Submeasure 1.1.2. Strategic programs of scientific research and development works

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