



POLISH NATIONAL AGENCY
FOR ACADEMIC EXCHANGE



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PROGRAMME

<p>name of the unit:</p> <p style="text-align: center;">PLANT-BASED BIOMATERIALS ACCELERATED WEATHERING TESTING FOR POLYMERS</p> <p style="text-align: center;">Faculty of Chemistry, Institute of Polymer and Dye Technology, Lodz University of Technology</p>		<p>symbol:</p> <p style="text-align: center;">I-33</p> <p>http://polimbarw.p.lodz.pl/ www.biomatpol.p.lodz.pl</p>
<p>head of the unit:</p> <p style="text-align: center;">Anna Masek, PhD DSc, TUL Prof.</p>	<p>potential promoters:</p> <p>Anna Masek, PhD DSc, TUL Prof. (<i>auxiliary promoter</i>: Anna Kosmalska PhD, Małgorzata Latos-Brózio PhD)</p>	<p>contact person:</p> <p>Anna Masek, PhD DSc, TUL Prof. tel: 42-631-32-93 anna.masek@p.lodz.pl</p>
<p>scope of activities:</p> <p>Inspired by the phenomena occurring in nature and taking advantage of its benefits, we work on obtaining fully environmentally friendly biomaterials.</p> <p>I. Analysis of ageing and degradation processes of polymeric materials:</p> <ul style="list-style-type: none"> Controlled degradation of polymeric materials (UV aging, weathering, thermo-oxidative ageing, thermal shock, composting, ozone aging, biodegradation with carbon dioxide emission measurement). Studies on biodegradation of polymers. Pro-ecological stabilization of polymeric materials. Determination of lifetime of polymers. Design of polymer composites with controlled lifetime. Aging catalysts for polymers. <p>II. Bio-inspired polymer materials (biofillers, biopolymers, self-healing materials, biocomposites).</p> <ul style="list-style-type: none"> Application of reinforcing cellulose fibers in polymer composites. Chemical and mechanochemical modification of cellulose fibers. Biocomposites based on polymers from renewable raw materials (PCL, PLA, PHA) - green polymers. <p>III. Plant-derived substances and their use in polymers:</p> <ul style="list-style-type: none"> The conducted research focuses mainly on the use of additives of natural origin in polymers. Research is carried out both on synthetic polymers of general use and, to a large extent, on biopolymers. Mainly additives of natural origin are used, both in non-concentrated form and in the form of plant extracts, including the use of supercritical extraction. An equally important issue is their practical application, for example as aging inhibitors, safe coloring substances or pro-ecological additives increasing the possibility of biodegradation of polymeric materials. Analysis of antioxidative properties of substances of natural and synthetic origin. <p>Bio-synthesis of flavonoids.</p>		<p>graphic material</p>  <p>biomatpolimery</p> 
<p>Present activities:</p> <ul style="list-style-type: none"> Colored aging time indicators for polymers. Bio-based food packaging obtained from plants materials. Polymer biocomposites reinforced with modified cellulose fibers. 		



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Future activities:

- Nature-inspired hybrid polymer biomaterials.
- Intelligent bio-packaging from renewable raw materials.
- Synthesis of new biopolymers from renewable resources.

Publications/patents, awards, projects:

1. M. Latos-Brózio, A. Masek, The application of natural food colorants as indicator substances in intelligent biodegradable packaging materials, *Food and Chemical Toxicology*, 2020, 135, 11097, doi: 10.1016/j.fct.2019.110975.
2. A. Masek, E. Chrześcińska, M. Latos-Brózio, M. Zaborski, Characteristics of juglone (5-hydroxy-1,4-naphthoquinone) using voltammetry and spectrophotometric methods, *Food Chemistry*, 2019, 301, 125279, doi: 10.1016/j.foodchem.2019.125279.
3. S. Cichosz, A. Masek, K. Wolski, Innovative cellulose fibres reinforced ethylene-norbornene copolymer composites of an increased degradation potential, *Polymer Degradation and Stability*, 2019, 159, 174-183.

Keywords:

biopolymers, degradation, cellulose, biocomposites, polymer ageing, biopolymers, PLA, packaging

List of internship proposals in the research team:

1. Cooperation in the synthesis and modification of new polymer biomaterials with specific properties and controlled degradability.
2. Intelligent bio-packaging modified with raw materials of plant origin.
3. Advanced methods of analysis of aging mechanisms of polymeric materials.