POLISH NATIONAL AGENCY FOR ACADEMIC EXCHANGE

STER PROGRAMME

name of the unit:

# INSTITUTE OF POLYMER AND DYE TECHNOLOGY

Faculty of Chemistry, Lodz University of Technology

symbol:

I-33

http://www.polimbarw.p.lodz.pl

| head of the unit: | potential promoters: | contact person: |
|---|---|---|
| Prof. Krzysztof Strzelec, PhD, DSc | Prof. Krzysztof Strzelec PhD, DSc<br>Anna Strąkowska, PhD | Anna Strąkowska, PhD<br>tel: 42-631-3211<br>anna.strąkowska@p.lodz.pl |

scope of activities:

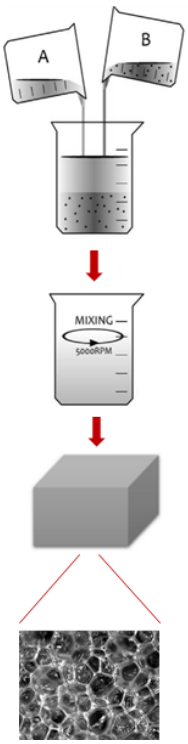
The main areas of interest and research directions are the synthesis, modification and analysis of the properties of porous and nanoporous materials. Current topics include:

- Synthesis of rigid and flexible polyurethane foams modified with additives of natural and waste origin, aimed at improving functional properties, with a strong emphasis on mechanical and flame-retardant properties of the obtained composites.
- Synthesis of rigid and flexible polyurethane foams with the use of polyol from renewable sources (biomass) or recyclates (eg PET), aimed at replacing the petrochemical component with a more environmentally friendly one, with an emphasis on improving performance properties.
- Synthesis of nanoporous materials (aerogels) dried at ambient temperature from reinforced with substances of natural origin, characterized by very good insulating properties, having a thermal conductivity value ($\lambda$) lower than those of commercially available insulating materials.

present activities:

We synthesize polyurethane foams containing cellulose-derived additives of natural origin, i.e. coconut fibers, walnut shells, fruit seeds to strengthen porous composites. We develop synergistic, environmentally friendly flame retardant systems that can effectively prevent fire from polyurethane foams. We develop microcapsule systems used for autonomous self-repair of polyurethane composites. We conduct a series of tests of the properties of porous materials, ranging from structure to physico-chemical properties, as well as thermal stability and flammability of composites.

graphic material




Future activities:

Synthesis of nanoporous foams - aerogels, which are characterized by high porosity, low apparent density and low thermal conductivity. The most important stage in the production of polymer aerogels is the drying procedure, which determines their nanoporous structure and other material properties. The selection of components is planned in such a way that it is possible to dry the aerogels at ambient temperature, which has not been described in the literature so far, and at the same time would allow for obtaining nanoporous structures in a less complicated and costly way.

Keywords:

polyurethanes and biopolyurethanes, porous and nanoporous materials, natural flame retardants, aerogels, polyols, recyclates, biomass

The portfolio of research groups was created as part of the Programme "STER" – Internationalisation of doctoral schools" as part of the realization of the project "Curriculum for advanced doctoral education & taining – CADET Academy of Lodz University of Technology".

List of internship proposal in this research team:

Collaboration in the implementation of current research topics related to the synthesis and testing the properties of porous composites.

List of attachments:

- Członka, S.; Kairytė, A.; Miedzińska, K.; Strąkowska, A. Polyurethane Hybrid Composites Reinforced with Lavender Residue Functionalized with Kaolinite and Hydroxyapatite. Materials (Basel). 2021, 14, 415.
- Członka, S.; Strąkowska, A.; Kairytė, A. Coir Fibers Treated with Henna as a Potential Reinforcing Filler in the Synthesis of Polyurethane Composites. Materials (Basel). 2021, 14, 1128.
- Strąkowska, A.; Członka, S.; Kairytė, A.; Strzelec, K. Effects of Physical and Chemical Modification of Sunflower Cake on Polyurethane Composite Foam Properties. Materials (Basel). 2021, 14, 1414.