POLISH NATIONAL AGENCY FOR ACADEMIC EXCHANGE

STER PROGRAMME

name of the unit:		symbol:
DIVISION OF POLYMER PHYSICS Department of Molecular Physics, Lodz University of Technology		K-31 http://www.kfm.p.lodz.pl
head of the unit:	potential promoters:	contact person:
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scope of activities:

The subject of the work includes the influence of the chemical structure and topology of the polymer chain on the dynamic and static properties of polymers in mass and in solution. The object of research are advanced polymer materials with complex architecture (branched polymers: stars, brushes, polymer networks. Particular interest is focused on the study of molecular dynamics and phase transitions in polymer materials, including networks, composites and hydrogels.

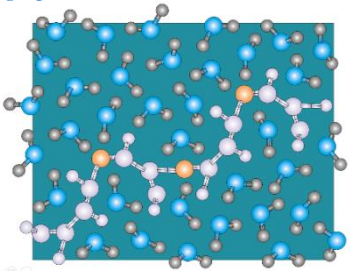
The second important area of research is devoted to the electrical properties of polymeric materials and their dependence on temperature and frequency.

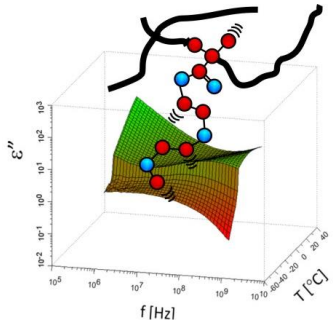
Research covers both experimental work and computer simulations over a wide range of times and sizes.

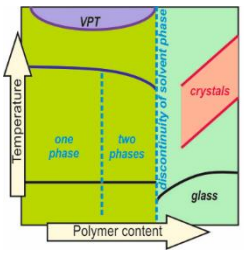
present activities:

- studies of molecular dynamics of polymeric materials with star and brush topologies;
- testing the diffusion properties of polymer solutions and gels;
- study of water crystallization and melting in polymer networks;
- study of phase transitions in crystallizable networks made of poly(oligoether methacrylates) (POEGMA);
- study of molecular dynamics of polymer brushes in a confined space.

graphic material







Future activities:

- analysis of the influence of the presence of hydrophobic comonomers on molecular dynamics and phase transitions in copolymers based on POEGMA
- study of phase transformations and electrical properties in three-component systems: polymer - water - ionic liquid

Keywords:

polymer brushes, polymer stars, molecular dynamics of polymers, relaxation processes in polymers, polymer networks, phase transitions in polymers

List of internship proposal in this research team:

- testing the physicochemical properties of polymer organogels filled with ionic liquids

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 attachments:

from 2018 „Rola dyfuzji w procesie syntezy i jej wpływ na właściwości fizyko-chemiczne hydrożeli polimerowych - symulacja i eksperyment” projekt OPUS (NCN)

Wrzesińska, A. et al., Effect of metal-ligand coordination complexes on molecular dynamics and structure of cross-linked poly(dimethylosiloxane) (2020) Polymers, 12 (8), art. no. 1680, DOI: 10.3390/POLYM12081680

Czaderna-Lekka A., Kozanecki M.“Molecular dynamics of poly(2-(2-methoxyethoxy)ethyl methacrylate) hydrogels studied by broadband dielectric spectroscopy” (2021) Polymer 222, art. no. 123618 DOI:10.1016/j.polymer.2021.123618