
Soft Matter Group

Offer

We offer our expertise within a diverse range of issues related to design, synthesis, characterization and computer modelling of polymer systems, across the broad range of their applications.

Know-how & Technologies

Using computer simulations, we are able to provide insight into the processes on a molecular basis and foreshadow the targeted synthesis and (self)assembly.

- Coarse-grained simulations allow us to model macromolecules and nanostructures on length scales > 10 nm, beyond the reach of conventional atomistic simulations.

"Our mission is the understanding and design of novel soft and responsive nanomaterials using a combination of experiments and computer modeling."

Content of Research

- Association of block copolymers
- Ionization behaviour of pH-responsive (weak) polyelectrolyte systems
- Swelling properties of polyelectrolyte hydrogels
- Modeling of polyelectrolyte solutions for application in redox-flow batteries
- Water desalination using polyelectrolyte hydrogels

Main Capabilities

- Polymer synthesis
- Light scattering
- Atomic force microscopy
- Transmission electron microscopy
- Coarse-grained modelling of (ionizable) polymer systems

Key Research Equipment

Experimental

- Light scattering
- Transmission electron microscopy
- Atomic force microscopy
- Calorimetry
- Fluorimetry modelling
- Coarse-grained simulations of polymers including ionization reactions
- Mean-field analytical and numerical modelling

Partnerships & Collaborations

Academic Partners

1. Cooperation with many academic research groups in the Czech Republic as well as in Europe through collaborative projects
2. Important cooperation with the Institute of Macromolecular Chemistry from Academy of Sciences, Prague, Czech Republic
3. Participation the EU project OP VVV "Excellent Research Teams" – Charles University Centrum of Advanced Materials (CUCAM).

Main Projects

1. EU project OP VVV "Excellent Research Teams", project No.CZ.02.1.01/0.0/0.0/15_003/0000417 – CUCAM, starting in 2016.

Are you interested in this expertise?

Please contact CPPT UK

Web: www.cppt.cuni.cz/

Mail: transfer@cuni.cz

Phone: +420 224 491 255

Experts and their Department

Assoc. Prof. RNDr. Miroslav Štěpánek, Ph.D.

Department of Physical and Macromolecular Chemistry

Web: www.physchem.cz/research/soft-matter