
Photochemistry and Supramolecular Chemistry of Porphyrinoids

"We are looking for cooperation in the fields of applications of photoactive nanomaterials in medicine or biomedical science."

Offer

- Our mission is the development of new photoactive nanomaterials (polymer nanofiber membranes and nanoparticles) generating highly antimicrobial species ($^1\text{O}_2$ and/or NO radical) for visible light-activated sterilization and other antibacterial and antiviral applications in medicine (surgical masks, wound covering etc.).
- Herein we offer you our expertise within a several range of issues related to the design, preparation, and characterization/ evaluation of photoactive nanomaterials with anti-microbial photodynamic inactivation.

Know-how & Technologies

The recent research of the group lays in chemistry and photophysics of porphyrin-type photosensitizers, in the formulation of new photofunctional (nano) materials and self-assembled structures with potential impact in medicine, light-harvesting, and sensing.

- Synthesis and characterization of porphyrinoid photosensitizers
- Preparation of photoactive nanofiber materials by electrospinning generating $^1\text{O}_2$ and/or NO radicals
- Preparation of photoactive nanoparticles from nanofiber materials releasing $^1\text{O}_2$ and/or NO radical
- Characterization of photoactive nanomaterials (nanofibers, nanoparticles)
- Detection methods for evaluation of (photo)generation of $^1\text{O}_2$ and/or NO radical in several media
- Antimicrobial photodynamic inactivation in the field of photodynamic therapy and photodisinfection (PDT)

Main Capabilities

Controlled irradiation by several light sources (lasers, lamps), steady state and time-resolved absorption and emission spectroscopy, synthesis of porphyrinoid photosensitizers, electrospinning, chemical methods of $^1\text{O}_2$ and/or NO detection, detection of $^3\text{O}_2$ in aqueous media.

Research Equipment

Steady state as well as time-resolved absorption and emission spectroscopy, electrospinning device, standard equipment for synthesis and characterization of porphyrinoids.

Current Projects

- EU project OP VVV "Excellent Research Teams", project No. CZ.0 2.1.01/0.0/0.0/15_003/0000417 – CUCAM, starting in 2016
- Czech Science Foundation 16-15020S – Photoactive Polymer Materials with Nanostructured Surfaces for Biomedical Applications, starting in 2016

Achievements

- **Patent:** Mosinger J., Jirsák O., Mosinger B., Mareš L.: System containing at least one layer of nanofibers and the method of nanofibers production. PV 2006-432, PS3477 CZ (2006)
- In the last 10 years, more than 40 papers in impacted international journals.
- Book chapter "Photoactivatable Nanostructured Surfaces for Biomedical Applications" in "Light-Responsive Nanostructured Systems for Applications in Nanomedicine" (S. Sortino ed.), Topics in Current Chemistry 370, 2016 (ISBN 978-3-319-22941-6)
- Book chapter "Nanofibers and Nanocomposite Films for Singlet Oxygen-Based Applications" in "Singlet Oxygen" (S. Nonell, C. Flors eds.), RSC 2016 (ISBN 978-1-78262-038-9)

Partners and Collaborations

Academic Partners

- Cooperation with many academic research groups in the Czech Republic as well as in Europe through collaborative projects
- Cooperation with many academic research groups in the Czech Republic as well as in Europe (University of Catania, Italy) through collaborative projects
- Important cooperation with J. Heyrovský Institute of Physical Chemistry and Institute of Inorganic Chemistry from Academy of Science, Prague, Czech Republic
- Participation on the EU project OP VVV "Excellent Research Teams" – Charles University Centrum of Advanced Materials (CUCAM)

Public and Private Sector

Elmarco, s.r.o., Liberec

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Are you interested in this expertise?

Please contact CPPT UK

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Experts and their department

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