POLISH NATIONAL AGENCY FOR ACADEMIC EXCHANGE

STER PROGRAMME

name of the unit:

DIVISION OF DYE TECHNOLOGY

Institute of Polymer and Dye Technology, Lodz University of Technology

symbol:

I-33

http://polimbarw.p.lodz.pl

head of the unit:	potential promoters:	contact person:
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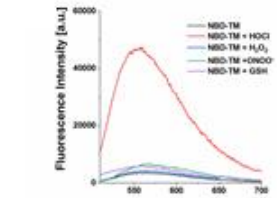
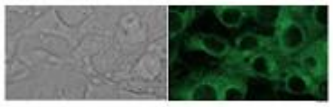
scope of activities:

Synthesis and investigation of the properties of novel fluorescent dyes and bioluminescent compounds. Synthesis of highly selective new colorimetric and/or fluorescent chemosensors for detection, among others biothiols, cyanides and other analytes. Synthesis and testing of new luminogenic and fluorogenic probes for the detection of reactive oxygen and nitrogen species with potential application in biomedical analysis. Studies of photostability and photoelectrochemical degradation of structurally different dyes. Synthesis and study of the properties of new azo dyes. Photoinitiators of radical, cationic and hybrid polymerization initiated by visible light.

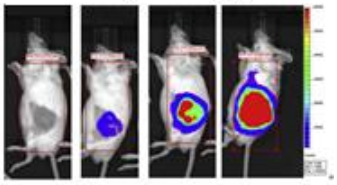
graphic material



Fluorescent imaging of the generation of peroxynitrite in macrophages



Tumor growth imaging



present activities:

Research includes the design and synthesis of new fluorescent dyes with high quantum yield of emission. The second area of scientific activity includes the synthesis and application of new fluorogenic and luminogenic probes and sensors used for the detection of biologically important oxidants (peroxynitrite, hypochlorous acid, hydrogen peroxide) and other analytes (biothiols, cyanides, hydrogen sulfide, azanon). Our works also focus on the development of methods for the detection of the above-mentioned compounds in cellular systems and the application of probes for in vivo imaging of different analytes.

Future activities:

The continuation of the present research aimed at searching for new fluorescent and bioluminescent compounds with NIR and SWIR emission and new selective probes.

publication/patents, awards, project:

Most relevant publications:

- M. Świerczyńska, D. Słowiński, A. Grzelakowska, M. Szala, J. Romański, K. Pierzchała, P. Siarkiewicz, R. Michalski, R. Podsiadły, Selective, stoichiometric and fast-response fluorescent probe based on 7-nitrobenz-2-oxa-1,3-diazole fluorophore for hypochlorous acid detection, Dyes and Pigments 2021, 192, 109563.
- D. Słowiński, M. Świerczyńska, A. Grzelakowska, M. Szala, J. Kolińska, J. Romański, R. Podsiadły, Hymecromone naphthoquinone ethers as probes for hydrogen sulfide detection, Dyes and Pigments 2021, 196, 109765
- A. Grzelakowska, M. Zielonka, K. Dębowska, J. Modrzejewska, M. Szala, A. Sikora, J. Zielonka, R. Podsiadły, Two-photon fluorescent probe for cellular peroxynitrite: Fluorescence detection, imaging, and identification of peroxynitrite-specific products, Free Radical Biology and Medicine 2021,169, 24.
- J. Kolińska, A. Grzelakowska, Novel styrylbenzimidazolium-based fluorescent probe for reactive sulfur species: Selectively distinguishing between bisulfite and thiol amino acids, Spectrochimica Acta Part A: 2021, 262, 120151.

- A. Grzelakowska, J. Modrzejewska, J. Kolińska, M. Szala, M. Zielonka, K. Dębowska, M. Zakłos-Szyda, A. Sikora, J. Zielonka, R. Podsiadły, Water-soluble cationic boronate probe based on coumarin imidazolium scaffold: Synthesis, characterization, and application to cellular peroxynitrite detection, Free Radical Biology and Medicine 2022, 179, 34. Research project: Fluorogenic and luminogenic probes for in vivo biophotonic imaging of peroxynitrite - from synthesis to footprint detection (SONATA BIS-6, NCN) Biotinylated boronic acid derivative as a tool for targetable detection of oxidants in cancer cells (PRELUDIUM-20, NCN).
keywords: dyes, pigments, fluorescent dyes, fluorogenic and luminogenic probes
List of internship proposal in this research team: Synthesis of new fluorescent dyes with emission in the range of visible, NIR and SWIR light. Synthesis of new selective probes for applications in biomedical research.