Cracow University of Technology

INTERNATIONAL WARSAW INVENTION SHOW

POLSKIEWYNALAZKI
STOWARZYSZENIE POLSKICH WYNALAZCÓW I RACJONALIZATORÓW

Fluorescent molecular chemosensors for Detection and measurement of metal ions in living systems

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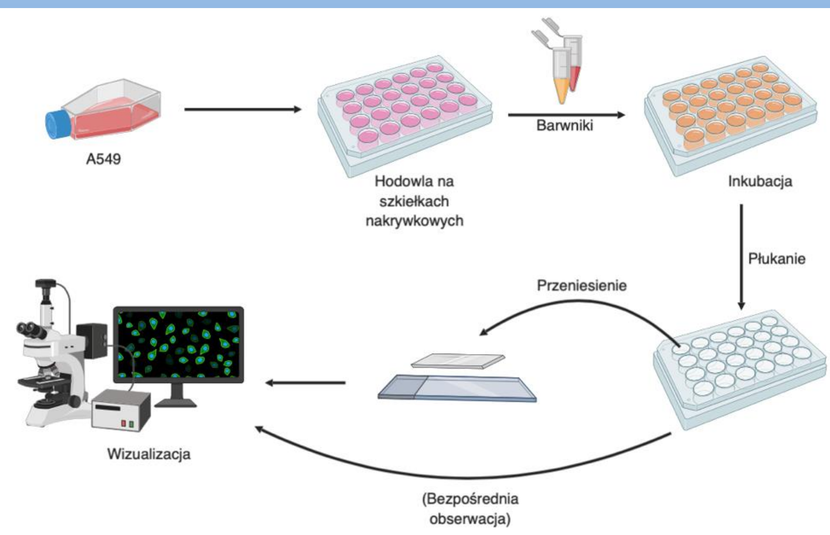
The invention relates to the development of new fluorecsent chemosensors that are 2-amino-4,6-diphenyl-pyridine-3-carbonitrile derivatives that are successfully suitable for biological research using fluorescence or confocal microscopy. The developed fluorescent sensors penetrate inside the cells through the cel membranę and, what is extremely important from the application point of view, selectivity combine with specific cell structures and simultaneously emit fluorescent light of a specific color (specific wavelength). The use of developed 2-amino-4,6-diphenyl-pyridine-3-carbonitrile derivatives as the role of fluorescent chemosensors allows the labeling of individual cel organelles and the monitoring of chemical processes inside the cell in-situ and on-line.
Thus, the use of these sensors for ions Detection in living systems can be a breakthrough in medicine. It may contribute to the early diagnosis of poisoning by metal ions and prevent serious disease progression as well as visualize their location in cells



Scheme 1. Diagram ilustrating the new bioimaging method

Optical Sensors for Biomedical Diagnostics – Fluorescent Sensors for Detection of Metal Ions

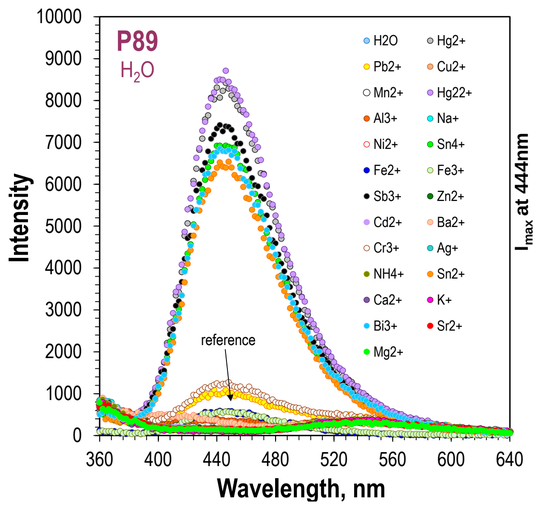


Fig. 1. Change of fluorescence intensity for P89 after various ion addition

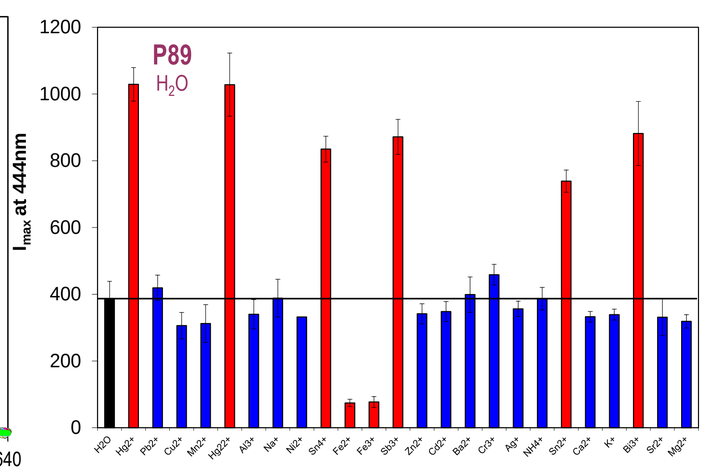


Fig. 2. Comparison of changes in the fluorescence intensity of the emission spectrum maximum for compound P89 in water after the addition of various ions

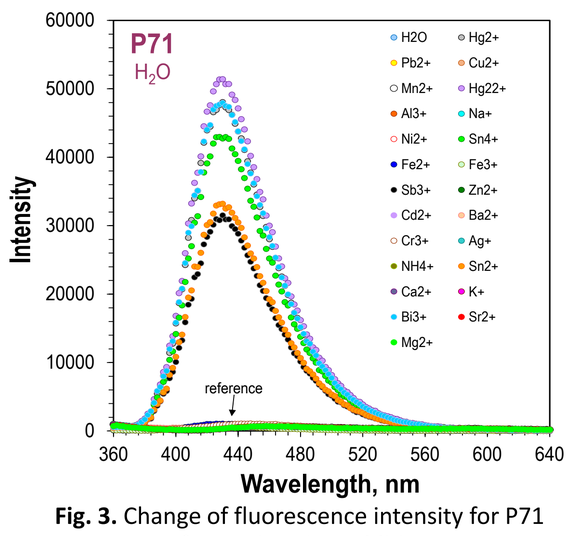


Fig. 3. Change of fluorescence intensity for P71 after various ion addition

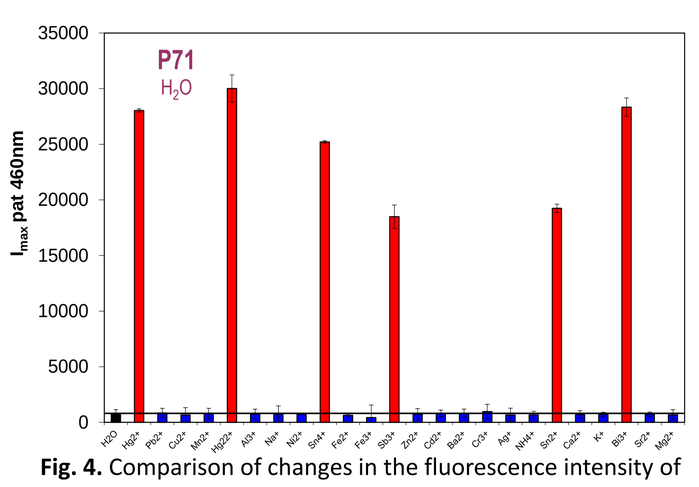
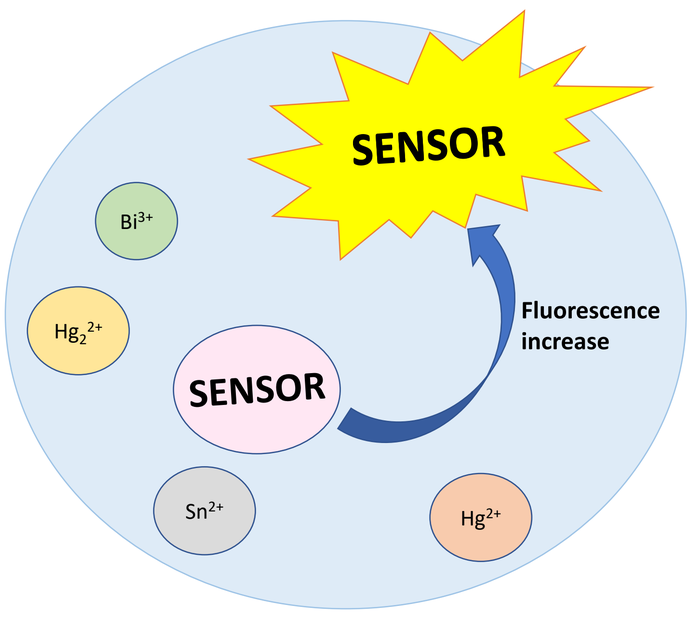


Fig. 4. Comparison of changes in the fluorescence intensity of the emission spectrum maximum for compound P71 in water after the addition of various ions



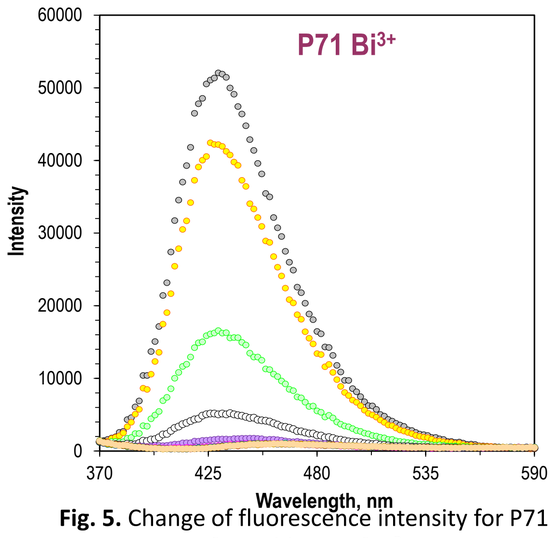


Fig. 5. Change of fluorescence intensity for P71 after addition of Bi^{3+}

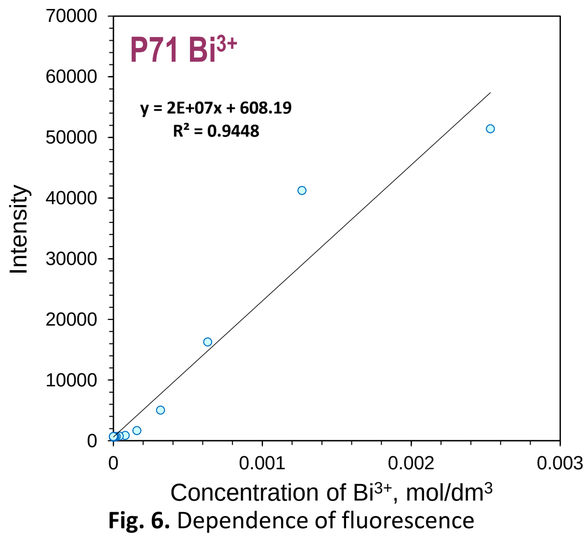
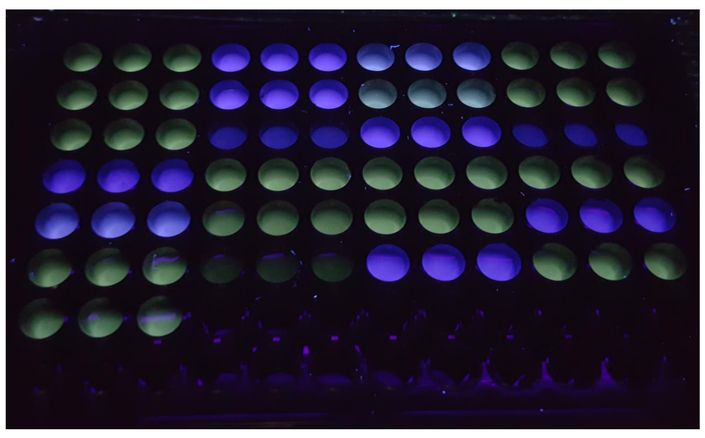
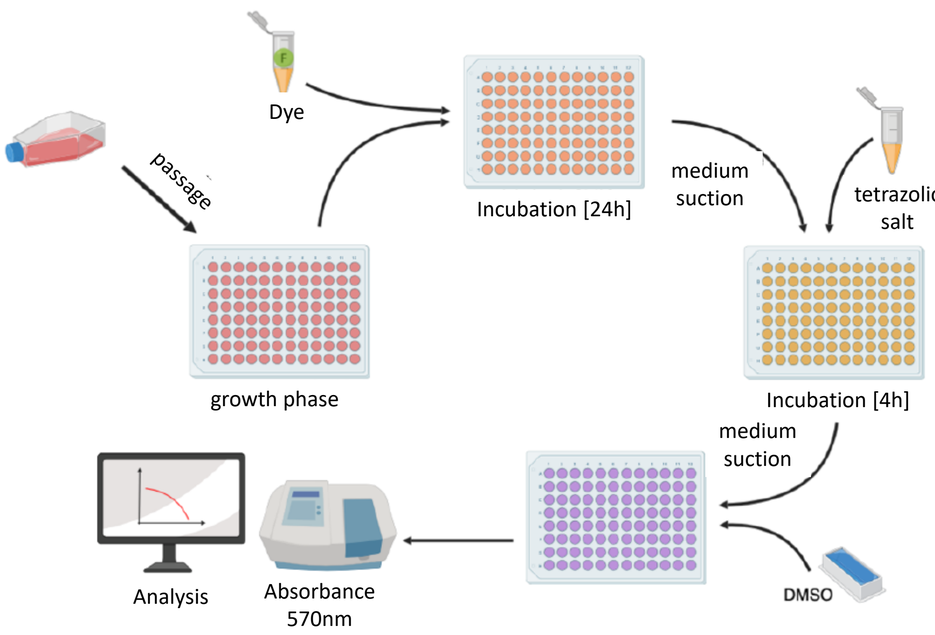


Fig. 6. Dependence of fluorescence intensity on Bi^{3+} concentration

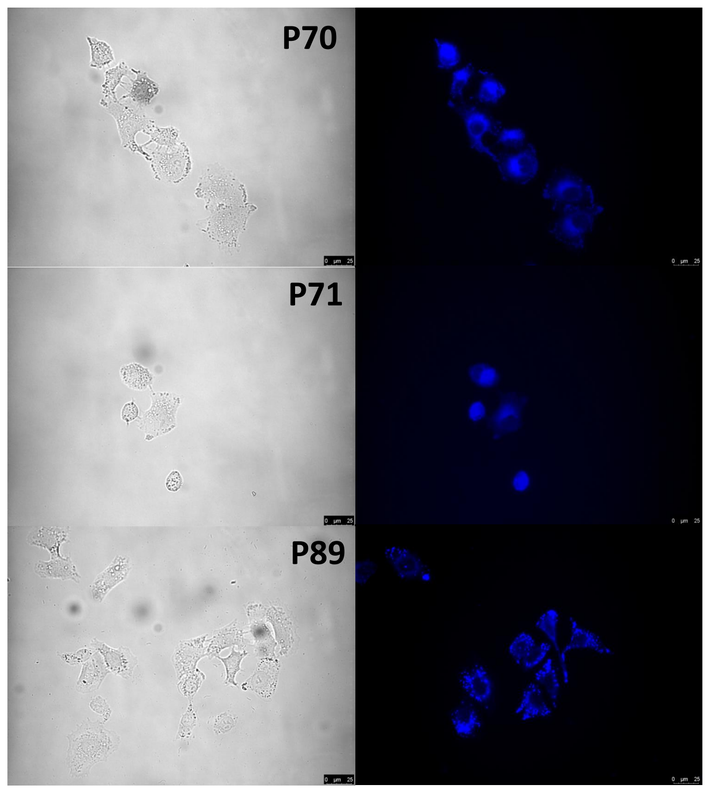


Phot. 1. 96-well plate of P70 in water with different ions

Optical Sensors for Biomedical Diagnostics – Bio-Imaging Sensors



Scheme 2. Principle of testing cytotoxicity



Photographs 2-7. The cells of the non-small cel lung cancer line (A549) incubated with sested chemosensors

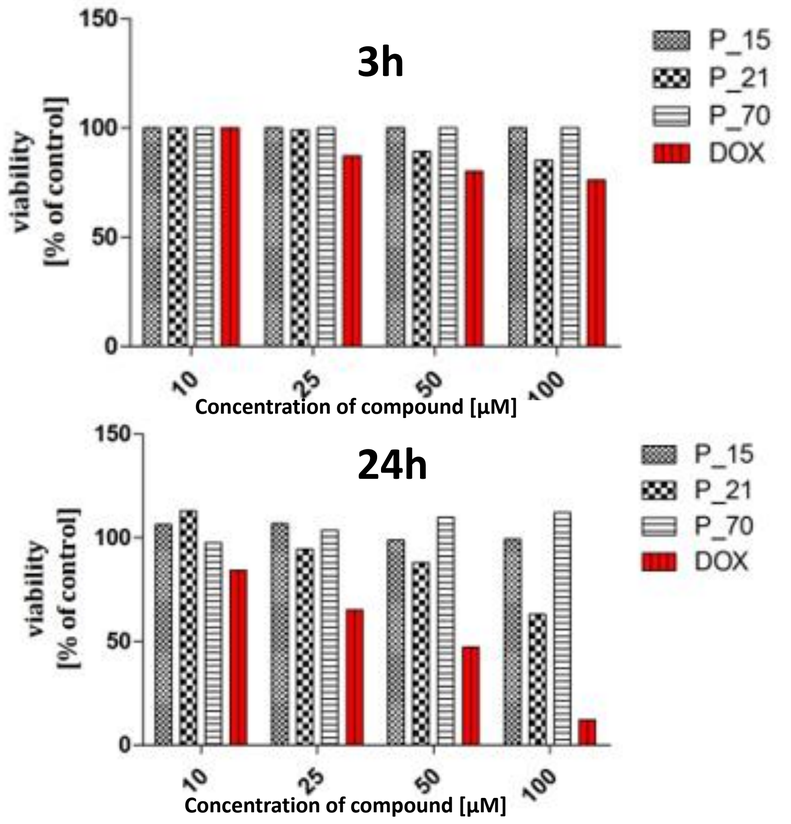


Figure 7-8. Comparison of cytotoxicity of tested chemosensors to doxorubicin (DOX) in the concentration range 10-100 µM after 3 hours and 24 hours of incubation.

Patent Application numer [P.429090]

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BENEFITS

- ✓ Non-toxic
- ✓ Excellent chemical stability
- ✓ Excellent luminescent properties
- ✓ Very long lifetimes

INDUSTRIAL APPLICATIONS

- ✓ Fluorescence Imaging – cell visualization, fluorescence probe technology; time-resolved chemical and biological analysis
- ✓ Detection od biologically and/or environmentally important cations, anions, small neutral molecules as well as biomacromolecules (such as proteins)