NANOTECHNOLOGIES

UTAustin Portugal

Optical Sensors and Photoactive Molecules for new Materials

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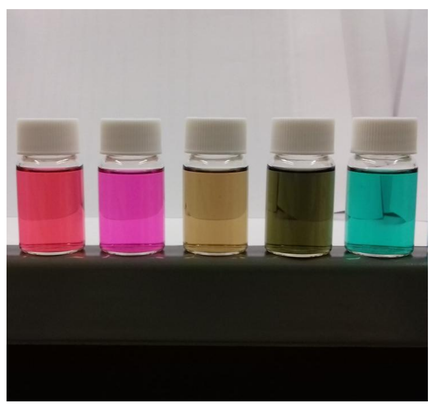
Background

Fluorescent molecules play a key role in many fields, including biotechnology and medical diagnosis. However, the use of these molecules has been compromised due to its hydrophobicity, tendency to aggregate in solution and low selectivity. The main goal of this project is the design of high-performance optical sensors and photoactive molecules to prepare new materials for environmental and biomedical applications.

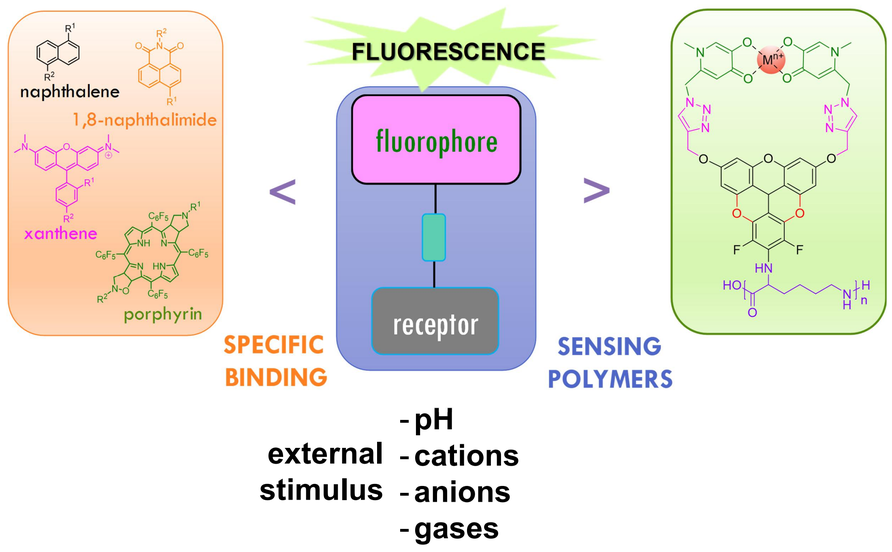
> OPTICAL SENSORS



> PHOTOACTIVE MOLECULES

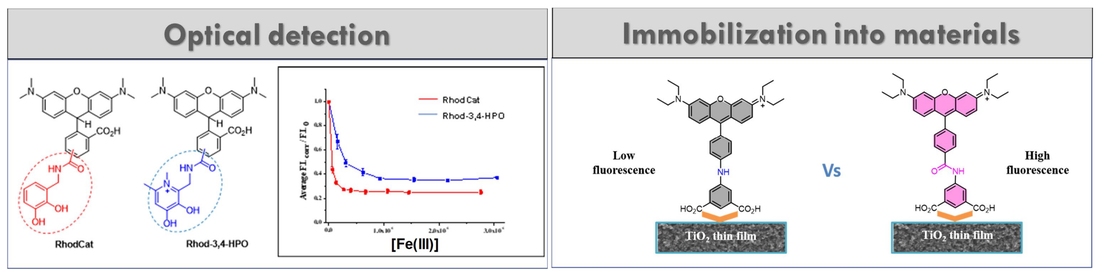
Methodology

By combining several functions in a single platform, we create bright and sensitive molecular architectures via two research lines: (i) structural modifications of fluorescent molecules, combined with specific receptors and polymeric materials, with environmental applications for sensing pollutants and contaminants, and (ii) integration of optical and bioactive molecules into nanostructures with application in biomedicine.



Results

Solution studies (UV-Vis and fluorescence) were performed in order to infer the sensors behavior towards analytes. This set of fluorescent compounds contains a receptor that enhances selectively and allows a fast response to external stimuli. In addition the incorporation of these compounds into sensing materials will be facilitated, making them also more stable and suitable for monitoring harmful analytes, such as metal ions [Fe^{3+}, Al^{3+}, Cu^{2+}, Zn^{2+} and Cr^{2+}], air pollutants (NO_2 and amines) or food contaminants (biogenic amines).



- **high selectivity**
- **fast response**
- **easy implementation**
- **durability properties**

Impact/Conclusions

The project promotes the development of innovative sensors/materials that are easily implement in devices for the prevention and detection of chemical, health, environmental and food hazards. Most commonly we couple chelators to different classes of fluorescent molecules, including rhodamines, fluoresceins, naphthalimides and porphyrins, in order to produce molecules that exhibit ‘OFF/ON’ or ‘ON/OFF’ response.

Recent examples of the application of synthetized sensors/materials include fluorescent chelators to monitor and sensing metal ions in body fluids and natural waters, anticancer, antimalarial, antimicrobial, and new anti-inflammatory drug candidates.

The research group integrates the laboratory CHEL2LIFE - Chelators to Life Sciences - led by Maria Rangel hosted at LAQV@REQUIMTE (https://www.chel2life.org/), and is located at the Department of Chemistry and Biochemistry of FCUP.

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