

Design, synthesis and evaluation of π -conjugated heterocyclic systems as novel chromo-fluorogenic probes

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The design and synthesis of chromo-fluorogenic probes for several analytes (anions, cations and neutral molecules) is a current and appealing topic of research with important applications in environmental monitoring and biological system characterization. Using these probes detection can be accomplished with simple readily available instrumentation (when using colorimetric probes) and at extremely low detection limits (when using fluorescence probes).

π -Conjugated heterocyclic compounds are versatile systems with a wide range of applications in diverse areas such as supramolecular, medicinal or materials chemistry due to their biological activity, as well their optoelectronic properties.¹⁻³ In particular for the design of chromo-fluorogenic probes, heterocyclic systems containing chelating groups have the ability to act as both the recognition unit, as well as the signalling unit, since variation of their absorption/fluorescence properties can happen during the recognition event. Generally, π -conjugated heterocyclic systems increase intramolecular electron delocalisation, enhancing photophysical properties. With careful design, the inclusion of heterocycles can optimize analyte recognition while simultaneously leading to more intense fluorescence and, therefore, higher sensitivity.⁴⁻⁹ Recent examples from our research group exemplifying the design, synthesis and characterization of several families of heterocyclic systems as chromo-fluorogenic sensors for cations and anions with analytical, environmental and medicinal relevance will be presented and discussed.

References

1. Fernandes, S. S. M.; Castro, M. C. R.; Mesquita, I.; Andrade, L.; Mendes, A.; Raposo, M. M. M., *Dyes Pigments* **2017**, *136*, 46.
2. Garcia-Amorós, J.; Castro, M. C. R.; Coelho, P.; Raposo, M. M. M., Velasco, D., *Chem. Commun.* **2016**, *52*, 51322.
3. Raposo, M. M. M.; Herbivo, C.; Hugues, V.; Clermont, G.; Castro, M. C. R.; Comel, A. Blanchard-Desce, M., *Eur. J. Org. Chem.* **2016**, *31*, 5263.
4. Raposo, M. M. M.; García-Acosta, B.; Ábalos, T.; Calero, P.; Martínez-Máñez, R.; Ros-Lis, J. V.; Soto, J., *J. Org. Chem.* **2010**, *75*, 2922.
5. Oliveira, E.; Batista, R. M. F.; Costa, S. P. G.; Raposo, M. M. M.; Lodeiro, C., *Inorg. Chem.* **2010**, *49*, 10847.
6. Batista, R. M. F.; Oliveira, E.; Costa, S. P. G.; Lodeiro, C.; Raposo, M. M. M., *Talanta* **2011**, *85*, 2470.
7. Marín-Hernández, C.; Santos-Figueroa, L. E.; Moragues, M. E.; Raposo, M. M. M., Batista, R. M. F.; Costa, S. P. G.; Pardo, T.; Martínez-Máñez, R.; Sancenón, F., *J. Org. Chem.* **2014**, *79*, 10752.
8. Batista, R. M. F.; Costa, S. P. G.; Raposo, M. M. M., *Sens. Actuators B: Chemistry* **2014**, *191*, 791.
9. Marín-Hernández, C.; Santos-Figueroa, L. E.; Sayed S.; Pardo, T.; Raposo, M. M. M., Batista, R. M. F.; Costa, S. P. G.; Sancenón, F. Martínez-Máñez, R., *Dyes Pigments* **2015**, *122*, 50.

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