



BASHY: A Useful Fluorescent Platform for Bioimaging

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Abstract

Fluorescent dyes are a highly valuable class of functional molecules that are widely used to probe the complexity of biological processes. In recent years, many efforts have been made to expand the chemical space of these compounds by designing chromophores with structural and photophysical properties tailored for bioimaging. In this quest, it is often necessary to diversify the dye architecture to meet the biological requirements of the specific application. However, this can be a particularly difficult task as molecular diversification often affects the electronic structure and thus the photophysical properties of the chromophore. Therefore, the discovery of synthetic methods to generate easily tunable dyes with predictable fluorescence properties is crucial to support the imaging of complex biological processes. In this context, the high structural diversity offered by multicomponent reactions (MCRs) can be a particularly useful strategy for the discovery and diversification of functional fluorescent molecules. However, while the current use of MCRs has led to the easy conjugation of chromophores to other functional moieties, the application of these reactions to chromophore discovery and optimisation has been much less explored. This lack of use is due to the fact that very few MCRs produce fluorescent cores with properties suitable for use as dyes. Recently, we have discovered an MCR-based fluorophore core (BASHY - boronic acid derived salicylidene hydrazone) with exceptionally high brightness and environmentally sensitive emission in the green-red spectral range, and a modularity that allows its use in many different applications in chemical biology. This talk will discuss the journey of BASHY dyes from discovery to their use under the microscope.

Biosketch

Gois studied chemistry at the New University of Lisbon, where he obtained his Ph.D. in 2005 under the supervision of Prof. Carlos Afonso. From May 2005 to May 2008, he worked as a postdoctoral researcher at the University of Sussex with Prof. F. Geoffrey N. Cloke FRS, at the University College of

London with Prof. Stephen Caddick and at the Instituto Superior Técnico (Technical University of Lisbon) with Prof. Carlos Afonso. In May 2008, he joined the Faculty of Pharmacy of the University of Lisbon (FFUL) as a research assistant in the medicinal chemistry group, and in July 2013, he was appointed principal investigator and head of the bioorganic group at the same institution. In 2017, he obtained his habilitation in pharmacy and was appointed assistant professor at the Faculty of Pharmacy. He now holds the position of associate professor with habilitation at the FFUL and is a member of various governing bodies of the institution, such as the School and Scientific Councils, and is part of the Executive Commission of the Research Institute for Medicines (iMed). Currently, Gois leads the Chemical Biology Laboratory at iMed, whose research programme focuses on the design of functional molecules that can be used to control biological processes and biomaterials.

Some awards/distinctions:

2024 – Career award by FFUL Students

2023 – Scientific Award in Chemistry and Chemical Engineering – University of Lisbon/Caixa Bank

2023 – Secretary General (Adjunct) – Sociedade Portuguesa de Química

2022 – Pioneering Investigator – Chemical Communications of RSC

2014 – Emerging Investigator by Chemical Communications of RSC

2012 – Vicente Seabra Medal – Portuguese Chemical Society (best chemist under 40)