Oral Presentation

NIR-Emitting Cyanine and Cyanine-Like Fluorophores: Synthesis, Optical Properties, and Biomedical Uses

Maged Henary

Department of Chemistry, Center for Diagnostics and Therapeutics, Georgia State University, Atlanta, Georgia 30303, United States, E-mail: mhenary1@gsu.edu.

ABSTRACT: Near-infrared (NIR) fluorescent compounds offer significant advantages over visible-wavelength emitters. Biological tissues exhibit lower absorption of NIR light, enabling deeper tissue penetration and assessment of deeper structures. Additionally, reduced autofluorescence in the NIR range allows for higher signal-to-background ratios. As a result, NIR-emitting molecular probes hold great promise for bioimaging diseased tissues. Cyanine dyes, a class of NIR fluorophores, consist of terminal heterocyclic rings connected by a polymethine chain. These dyes exhibit delocalization of electrons, resulting in longer absorption wavelengths. Our lab has recently discovered a new class of cyanine-like "donor-acceptor fluorophores" that absorb and fluoresce in the NIR range. These fluorophores feature a push-pull system comprising donor, acceptor, and linker units, which can significantly impact structure properties. In this presentation, we'll discuss the design and discovery of ZW800, a heptamethine cyanine dye with superior renal clearance, and currently in phase 3 clinical trials. We'll also compare its optical property and biodistribution to the FDA-approved indocyanine green (ICG). Furthermore, we'll outline the comparison of the synthesis and optical properties of cyanines and cyanine-like fluorophores. Then, a short cytotoxicity of breast cancer study of the cyanine like small molecules and docetaxel will be presented.

References

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