Benzo[*a*]phenoxazines as fluorescent probes for biomolecules

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Fluorescent techniques are essential tools in various fields of modern science, including molecular biology, biophysics, clinical diagnosis, environmental and analytical chemistry. Although the number of established fluorescence probes is now high, relatively few are long-wavelength light emitting (600–1000 nm), which is an important requirement for many of these bio-applications. This is largely owing to the fact that there is minimum interference from absorption scattering and a natural auto-fluorescence of biological molecules in this region of the electromagnetic spectrum.[1]

Thus, one of the most demanding challenges in this area is undoubtedly that of the design and synthesis of new fluorophores or derivatives of known fluorophores with improved water solubility, where the excitation and emission maxima lie beyond approximately 600 nm and the fluorescence quantum yields are high. In addition, these compounds must also include a functional group which is capable of efficient covalent bonding to biomolecules.

Of the longer wavelength emitting dyes, oxazine derivatives such as benzo[*a*]phenoxazines have seen a remarkable growth in research interest and technical importance, being used in the labeling of nucleic acids, amino acids and proteins.[2-5] Despite the interest of these polycyclic cationic systems as labels in biological applications, only a shorter number possesses the ability to form covalent bonds with the sample to be studied. Furthermore, since the variety of existing benzophenoxazines is reduced, the development of new suitable derivatives is of great interest.

The synthesis and photophysical properties of benzo[*a*]phenoxazinium chlorides possessing mono- and bifunctionalised side-chains, as well as long alkylamino substituents, and their applications as covalent and non-covalent probes of biomolecules, will be discussed in the present communication.

References

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