Synthesis and Spectroscopic Properties of New Fluorescent Poly(phosphorhydrazone) Dendrimers

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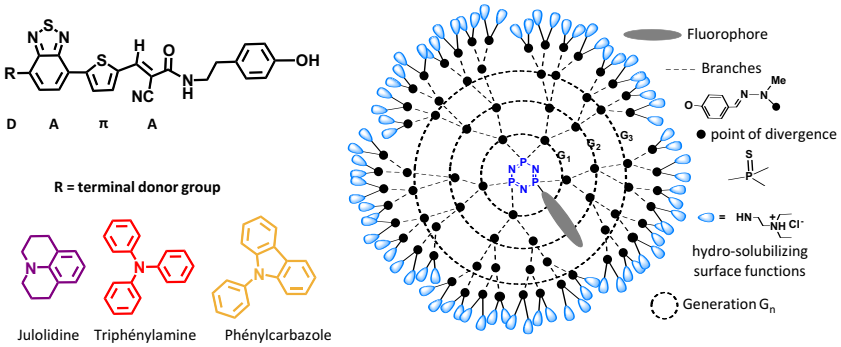
Fluorescence imaging has become an important technique in biology and medicine, particularly for the *in vivo* observation of biological processes.[1,2] However, many fluorescent probes currently used operate in the visible region (<650 nm), where tissue autofluorescence and limited light penetration significantly reduce the signal-to-noise ratio. To overcome these limitations, fluorophores emitting in the near-infrared (NIR) region, especially within the NIR-I (650–900 nm) and NIR-II (1000–1700 nm) windows, have been developed, enabling deeper imaging with reduced background interference.

Despite these advantages, many NIR fluorophores are highly hydrophobic, which limits their solubility in aqueous media and restricts their biological applications. A promising strategy to address this issue consists in grafting these fluorophores onto water-soluble dendrimers. These hyperbranched macromolecules possess a well-defined and highly tunable architecture resulting from their stepwise synthesis generation after generation, allowing precise control over their size, structure, and number of functional groups. Functional units can be introduced at the core, enabling the combination of hydrophilic functionalities and fluorescent units within a single structure adapted to biological environments.[3]

The aim of this presentation is to report the synthesis of new NIR fluorescent probes based on poly(phosphorhydrazone) (PPH) dendrimers combined with fluorophores designed according to a donor–acceptor–π–acceptor (D–A–π–A) architecture. These fluorophores incorporate electron-donating groups such as julolidine, triphenylamine, or phenylcarbazole and electron-withdrawing units including 2,1,3-benzothiadiazole and cyanoacrylate, linked through a π-conjugated thiophene spacer. This design allows fine tuning of the photophysical properties through targeted molecular modifications, particularly at the terminal donor group, which strongly influences the emission behavior.



References

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