Design, Synthesis and Characterization of Fluorescent Hyperbranched Polyglycerols with Covalently Bound Anti-Fading Agents

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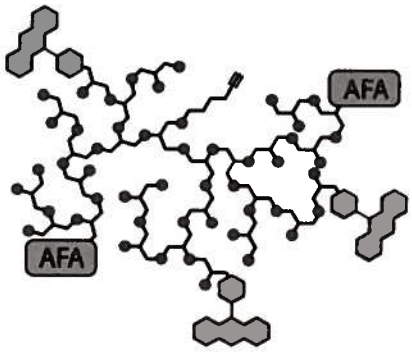
Photobleaching of fluorescent dyes currently limits studies in both time and laser intensity. Methods to combat photobleaching include deoxygenation and the addition of anti-fading agents (AFAs), however, these modifications are not always compatible, particularly with living cells. Promising preliminary results suggest that by covalently attaching anti-fading agents (trolox or gallate) and fluorescein to hyperbranched polyglycerols photobleaching can be significantly curtailed. Hyperbranched polyglycerols serve as a polyfunctional scaffold to link multiple dye moieties, thus increasing brightness, as well as hold AFAs in close proximity while decreasing their toxicity. While AFAs quench initial fluorescence, their presence sustains dye half-life substantially, which will allow for longer studies under laser irradiation.



A Universal Platform for Polyene Synthesis

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The polyene motif is prevalent in small molecules derived from a wide range of biosynthetic pathways, including polyketides, hybrid peptides/polyketides, polyterpenes, and fatty acids. These natural products are highly modular in their constitution, which suggests a potential general capacity for simple, efficient, and flexible construction via the iterative cross-coupling of pre-assembled building blocks. Herein we describe how the iterative assembly of 12 halo MIDA boronate building blocks can allow for the construction of the core polyene motifs of >75% of all polyene natural products that have ever been isolated.