Emissive Photoconversion Products of an Amino-triangulenium Dye - DTU Orbit

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Upon prolonged exposure to intense blue light, the tris(diethylamino)-trioxatriangulenium (A3-TOTA+) fluorophore can undergo a photochemical reaction to form either a blue-shifted or a red-shifted fluorescent photoproduct. The formation of the latter depends on the amount of oxygen present during the photoconversion. The A3-TOTA+ fluorophore is structurally similar to rhodamine, with peripheral amino groups on a cationic aromatic system. The photoconversion products were identified by UV−vis absorption and steady-state and time-resolved fluorescence spectroscopy, and further characterized by HPLC, LC-MS, and 1H NMR. Two reaction pathways were identified: a dealkylation reaction and an oxidation leading to formation of one or more amide groups on the peripheral donor groups. The photoconversion is controlled by the experimental conditions, in particular the presence of oxygen and water, and the choice of solvent. The results highlight the need to characterize the formation of fluorescent photoproducts of commonly used fluorescent probes, since these could give rise to false positives in multicolor/multi-label imaging, colocalization studies, and FRET based assays. Finally, an improved understanding of the photochemical reaction leading to bleaching of fluorescent dyes can lead to the creation of specific probes for fluorescence based monitoring of chemical reactions.

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