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BODIPY dyes in photodynamic therapy

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BODIPY dyes tend to be highly fluorescent, but their emissions can be attenuated by adding substituents with appropriate oxidation potentials. Substituents like these have electrons to feed into photoexcited BODIPYs, quenching their fluorescence, thereby generating relatively long-lived triplet states. Singlet oxygen is formed when these triplet states interact with $^3O_2$. In tissues, this causes cell damage in regions that are illuminated, and this is the basis of photodynamic therapy (PDT). The PDT agents that are currently approved for clinical use do *not* feature BODIPYs, but there are many reasons to believe that this situation will change. This review summarizes the attributes of BODIPY dyes for PDT, and in some related areas.

Introduction

Photodynamic therapy (PDT) is an emerging clinical modality for treatment of neoplastic and non-malignant lesions. Applications of PDT require a photosensitizing drug, light, and oxygen. A series of photochemical reactions generate *singlet* oxygen from the $^3O_2$ causing tissue damage in the regions where these three key components come together.[1,2] This is a highly localized effect because the half-life of singlet oxygen is low (0.6×10^{-6} s).[3] In cancer treatment, PDT can destroy the vasculature surrounding tumour cells, and activates immunological responses against them.[4] The main attribute of PDT is its potential for dual selectivity, *i.e.* preferential accumulation of the photosensitizer in diseased – over normal – tissues, and focusing light to confine damage to the targeted

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