Photooxidation of organosulfur compounds catalyzed by iodo-BODIPY derivatives under visible light irradiation

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Abstract: In this work, we design and synthesize three iodo-BODIPY derivatives, I-GB, 3I-GB and I-RB as photocatalysts for oxidation reaction of thiol. Catalysts I-GB and I-RB were synthesized in good yields from condensation reaction between 4-iodobenzaldehyde with corresponding pyroles, followed by DDQ oxidation and complexation with BF₃·OEt₂. For 3I-GB, beta-iodination of I-GB with iodine monochloride provided the product in 58% yield. All of iodinated BODIPYs were fully characterized by ¹H-NMR, ¹³C-NMR and high resolution mass spectrometry. The photocatalytic activities of all iodo-BODIPY derivatives were studied using Rose Bengal as a reference in an oxidation reaction of 4-chlorothiophenol. According to ¹H-NMR analysis, when irradiating 4-chlorothiophenol under white LED at room temperature for 60 min, I-GB, 3I-GB and I-RB gave disulfide product in 85, 100 and 100% yields, respectively, while Rose Bengal yields only 54%. From these results, it could be concluded that these BODIPYs should be able to serve as new photocatalysts for the oxidation of thiol into disulfide under visible light irradiation.

Keywords: BODIPYs; Photocatalyst