

Effect of DABCO as Singlett Oxygen Quencher on the Stability of Fluorophors

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Abstract

Fluorophors have been widely employed for the analytical fields of biotechnology, biochemistry and medical research due to their high quantum yield resulting in high sensitivity and the easiness to handle with since unlike luminophors there is no need for cofactors.¹⁾ There are series of fluorophors which are sensitive to certain analytes, such as pH, oxygen, ions etc. and which have been used for optical sensors for years. One of the biggest problem encountered in these applications is the bleaching of fluorophors caused by photoinduced oxidation by omnipresent molecular oxygen and which leads to drifts of the sensor and the decrease of the sensor sensitivity.²⁾ Most of fluorophors in their quantummechanical excited state act as oxygen sensitizer transforming triplet oxygen in the very reactive singlett form which oxidizes the fluorophor. However, there are a number of chemical compounds scavenger which are able to deactivate singlett oxygen.³⁾

In this study DABCO (1,4-diazabicyclo[2.2.2]octane) was investigated as a potential protecting additive. As a model fluorophor fluorescein-amine known for its low photostability was employed. The fluorophor was encapsulated in different types of solgels and immobilized on the well bottom of a 96wells microtiter plate. The fluorophor layer was exposed to light permanently for 16 days. The fluorescence was measured by microtiter reader Wallac Victor 2 (exc 485nm/ em 535nm). It was found that the change of fluorescence depended on the one hand on the DABCO concentration and on the other hand on the pH. At the measured wavelength range the fluorescence intensity increased in acidic medium as general trend whereas it decreased in the base range. Furthermore, the results showed that the weakening of the fluorescence intensity could be minimized by DABCO. Best result was obtained by DABCO concentration 1000 times higher than the fluorophor concentration. At this ratio and at pH 10 the fluorescence intensity was reduced only less than 10% whereas without DABCO it decreased by 33%.

Acknowledgement: This project is supported by the Center for Biophotonics Gwangju [BPF-2004-S-1-6]

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