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Rose Bengal based polymer colloids for photosensitized singlet oxygen production

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Harvesting visible light to implement low energy processes fulfills some principles of green chemistry. Photosensitized singlet oxygen production involving light, oxygen from air and catalytic amount of photosensitizer is particularly attractive for producing fine chemical intermediates of interest, for air/water photo-decontamination, or for photodynamic inactivation of bacteria¹. Immobilizing photosensitizers on solid substrates improves their handling, recyclability and photostability. In order to achieve a sustainable photochemical process, various generations of submicronic photoactive latex particles anchoring Rose Bengal (RB) as photosensitizer, were designed by miniemulsion polymerization² or dispersion polymerization (PISA) (present work) to meet the challenge of continuous flow photo-oxidation of biobased molecule while paving the way for organic photocatalyst recycling. This study focuses first on the design of photosensitizer-based core-shell latex particles synthesized by dispersion polymerization in ethanol. Through the determination of the average quantum yield of singlet oxygen production (ϕ_{Δ}), we proved the efficient production of singlet oxygen at the particle/alcohol interface under visible light irradiation. The present study proposes to investigate whether the colloidal features or RB loadings might affect ϕ_{Δ} . Preliminary outcomes of continuous flow photo-oxidation of a bio-based molecule will also be presented. Finally, the interest of latex particles is their film-forming properties to prepare coatings by simple casting. We indeed reported that the photosensitizing properties of Rose Bengal can be transferred to surfaces,³ which open perspectives to design functional surfaces for various applications such as antibacterial surfaces.

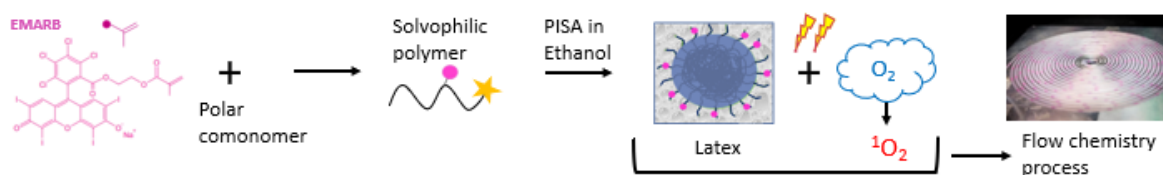


Figure 1: Scheme of synthesis of photosensitizer-based polymer colloids

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