

MEDIATED GENERATION OF CONJUGATE ACID BY UV AND BLUE SENSITIZERS WITH UPCONVERSION NANOPARTICLES

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Lanthanide-doped upconversion nanoparticles (UCNPs) based on NaYF₄ doped with Tm³⁺ and Yb³⁺ possess the capability to convert low energy radiation like near infrared radiation (NIR) around 980 nm into high energy radiation in the region of ultraviolet (UV) and blue light. The emitted light is capable to excite different UV and blue sensitizers which further lead to the generation of reactive species. This contribution focuses on the mediated generation of conjugate acid (con-H⁺) which can be formed by an initiating system comprising sensitizers and an onium salt with weak coordinating anion. Quantification occurred by treatment with Rhodamine B lactone whose color switched to intensive red after photolytic formation of con-H⁺. Exposure with a NIR Laser at 980 nm resulted in less con-H⁺ compared to a 395 nm UV LED where all sensitizers absorb radiation, Figure 1 [1]. The procedure disclosed helped in our case to understand why NIR- sensitized polymerization of epoxides did not succeed although it worked in the case of UV exposure at 395 nm using the same composition.

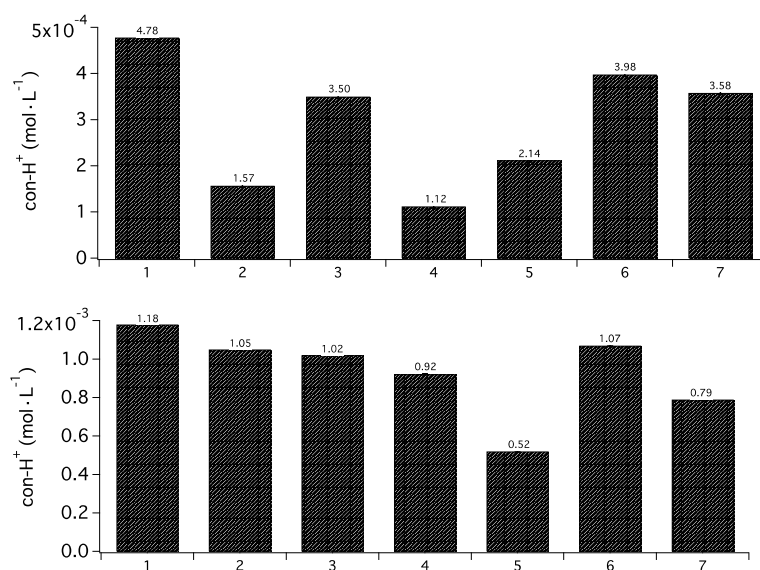


Figure 1. Conjugate acid formed by the sensitizers with an irradiation time of 60 min with NIR Laser (top) and with an irradiation time of 10 min with UV-LED (bottom).