

POLYMERIZATION INDUCED BY NIR IRRADIATION: PHOTOPOLYMERISATION VERSUS PHOTOTHERMAL POLYMERIZATION

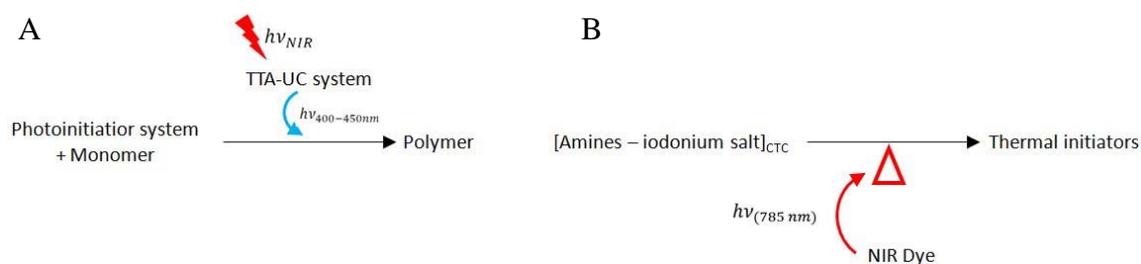
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NIR light induced polymerization has attracted more and more attention in the photopolymerization field due to the possibility to use safer and more penetrating wavelengths, reducing the hazardousness. A novel perspective for the Free Radical Polymerization (FRP) of (meth)acrylate-based monomers is proposed, relying on Triplet-Triplet Annihilation UpConversion (TTA-UC)¹. The photosensitive system designed here avoids the introduction of heavy metals, usually required in the TTA processes. Thermal imaging experiments and Real Time Fourier Transform Infrared (RT-FTIR) spectroscopy have been used to record the temperature during NIR irradiation and measure the reactive function conversion respectively. The competition between the TTA-UC and the NIR photothermal activation was investigated to compare the relative efficiency of both NIR processes. In view of the results obtained by the different methods, the photothermal effect seems to get the upper hand over the photoactivation of the system. The possibility to use the chemicals to initiate photothermal polymerization through Charge Transfer Complexes (CTCs) decomposition has been also investigated².



Scheme 1: A. Principle of the TTA-UC induced photopolymerization. B. Principle of the photoinduced thermal initiators formation

[1] Caron, A.; Noirbent, G.; Gignes, D.; Dumur, F.; Lalevée, J. *Macromol. Rapid Commun.* 2100047. <https://doi.org/10.1002/marc.202100047>.

[2] Caron, A.; Dumur, F.; Lalevée, J. *J. Polym. Sci.* 2020, 58 (15), 2134–2139. <https://doi.org/10.1002/pol.20200320>.