

BENEFITS OF HEATER ACTIVATION IN NIR RANGE FOR POLYMER PROCESSING

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Photoinduced thermal polymerization upon Near-InfraRed (NIR) light has been recently reported in the literature as an efficient tool for polymer synthesis [1]. In this work, a completely different approach is developed since polymeric materials containing a very low amount of a stimuli-responsive compound are prepared by using a benchmark UV photoinitiator. As the stimuli-responsive compound, an organic dye called heater strongly absorbing in the near-infrared region is selected. The heat released by its irradiation (Figure 1) with an inexpensive and highly penetrating NIR light source allows the development of an approach for reprocessing, reshaping and self-healing [2]. Several parameters have been studied in order to determine their influence on the polymer temperature such as the wavelength of the NIR irradiation, the irradiance of the NIR light source and the heater choice. Finally, shaping and self-healing ability of the thermoplastic have been investigated and furnished good results. Indeed, polymers could be shaped quickly upon NIR light without any external stimulus and large scratches could be healed after few minutes of NIR irradiation.

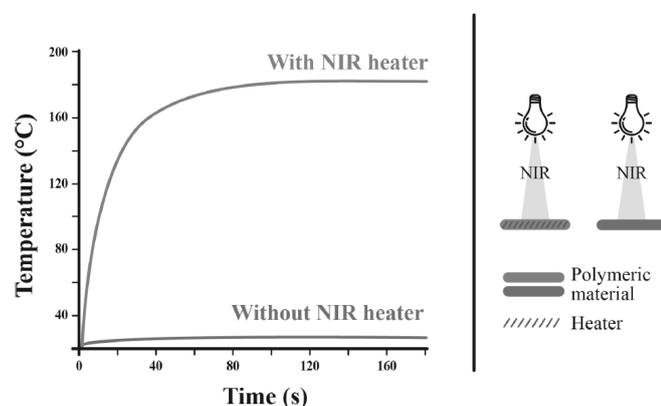


Figure 1. Photothermal effect of heater upon NIR light

[1] A-H. Bonardi, F. Bonardi, G. Noirbent, F. Dumur, C. Dietlin, D. Gigmes, J-P. Fouassier, J. Lalevee, Different NIR dye scaffolds for polymerization reactions under NIR light, *Polymer Chem.*, 10, 6505–6514 (2019).

[2] V. Launay, A. Caron, G. Noirbent, D. Gigmes, F. Dumur, J. Lalevee, NIR Organic Dyes as Innovative Tools for Reprocessing/Recycling of Plastics: Benefits of the Photothermal Activation in the Near-Infrared Range, *Adv. Funct. Mater.*, 2006324 (2020).