

Pre-associated ion-pair photoinitiating system for free radical photopolymerization

L. Niederst¹, X. Allonas¹, T. Rölle², C. Ley¹, M. Holzheimer², L. Pitzer²

*1/ Laboratory of Macromolecular Photochemistry and Engineering, University of Haute Alsace,
68093 Mulhouse France*

*2/ Covestro Deutschland AG, Specialty Films – Research and Development, 51365
Leverkusen, Germany*

A highly efficient photoinitiating system for radical photopolymerization based on a cationic dye having a sub-nanosecond excited state lifetime is presented. The use of an anionic coinitiator allows to override the diffusion limitation encountered for bicomponent systems with short-lived excited state lifetime of the dye¹. The mechanism of this photoinitiating system is described and modelled in order to calculate the dye-coinitiator pre-association efficiency. This factor is showed to rule the observed polymerization rate measured in real-time Fourier transform infrared spectroscopy. Using this photoinitiating system, high reactivity and material curing were achieved even under mild conditions (low photosensitizer concentrations, low LED intensity).

[1] J. Zhou, L. Pitzer, C. Ley, T. Rölle, X. Allonas, “Highly sensitive photoinitiating system based on pre-associated ion-pairs for NIR free radical photopolymerization of optically clear materials”, *Polym. Chem*, 13 (2022) *Polymer Chemistry*, 2022, 13, 6475 – 6483

Speaker's biography:

Léo Niederst has graduated from the ECPM engineering school (Strasbourg, France) and is currently a PhD student under the supervision of Xavier Allonas and Christian Ley, at the LPIM (Mulhouse). Léo is studying the photochemistry of photoinitiating systems for polymerisation.