

PHOTOLATENT BASES PROVIDING OPPORTUNITIES BEYOND SIMPLE CURING

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Upon irradiation, photolatent bases release a strong amine base. The latter is a stable compound that is capable to catalyze crosslinking reactions, but also other types of base catalyzed transformations. Thus, a photolatent base is not a photoinitiator, but a photolatent catalyst.

Several classes of photolatent bases have been reported in the literature. Most examples are ionic compounds with a correspondingly limited solubility in organic formulations. In addition, ammonium carboxylate salts, widespread used as photolatent bases cause, due to an equilibrium with the non-caged amine catalyst, an unacceptable short shelf life of the formulations. Recently we have developed a novel photolatent amine being a non-ionic neutral organic compound with excellent solubility in organic formulations. Upon irradiation, the superbase 1,5-Diazabicyclo[4.3.0]non-5-en (DBN) is released.

Crosslinking reactions catalyzed by strong bases are inherently slower than those based on radically curing formulations. For some applications, this can be turned into an advantage, since it provides, after irradiation, a time window during which additional processing steps can be performed before full cure is achieved.^[1]

Since the strong base released is a stable organic compound that, acting as a catalyst, is not consumed during the curing reaction, it remains reactive even in the absence of light, therefore allowing for full cure also in not fully irradiated regions. In addition to the crosslinking process, it can also concomitantly catalyze other transformations, such as the sol-gel reaction of siloxanes producing *in situ* siloxane nanoparticles, or the reduction of graphene oxide to graphene,^[2] thereby generating organic-inorganic hybrid materials^{[3] [4]} with outstanding properties. A further application is the formation of vitrimers.^[5] In this case the latent form is used as catalyst for the thermal crosslinking of the organic matrix, while the strong amine formed upon irradiation is an excellent catalyst for transesterification reactions that provide spatio-temporal-controlled vitrimeric properties.

References

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