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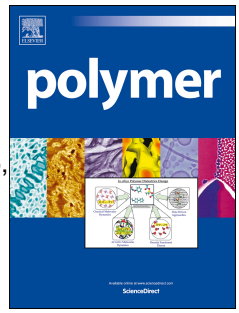

UV-Violet-Blue LED Induced Polymerizations: *Specific* Photoinitiating Systems at 365, 385, 395 and 405 nm

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UV-Violet-Blue LED Induced Polymerizations: *Specific* Photoinitiating Systems at 365, 385, 395 and 405 nm.

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Abstract:

Two naphthalimide derivatives (DMAENs) containing tertiary amine groups have been designed and synthesized. Upon exposure to near UV and visible LEDs (365 nm – 455nm), they lead to radicals without adding a hydrogen donor and, in combination with 2,4,6-tris(trichloromethyl)-1,3,5-triazine, an iodonium salt or *N*-vinylcarbazole, they produce radicals and cations. Compared to the well-known camphorquinone or bis(2,4,6-trimethylbenzoyl)-phenylphosphineoxide photoinitiator, the novel DMAENs containing photoinitiating systems are characterized by a very high reactivity for both the free radical polymerization of acrylates and the cationic polymerization of epoxides. This outstanding performance paves the way for polymerization in soft conditions (e.g. upon LED irradiation). The photochemical mechanisms are studied by Molecular Orbitals MO calculations, steady state photolysis, fluorescence, cyclic voltammetry, electron spin resonance spin trapping and laser flash photolysis techniques.

Keywords: naphthalimide derivatives, photoinitiator, near UV and visible LEDs.

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