

BENZOPHENONE CONTAINING CHARGE TRANSFER COMPLEXES AS VISIBLE LIGHT PHOTOINITIATORS

Turkan Gencoglu^a, Bernadette Graff^b, Fabrice Morlet-Savary^b, Jacques Lalevée^b,
Duygu Avci^a

^aDepartment of Chemistry, Bogazici University, 34342 Bebek, Istanbul, Turkey

^bInstitut de Science des Matériaux de Mulhouse IS2M, Université de Haute-Alsace,
F-68100 Mulhouse, France

Water soluble oligomeric photoinitiators (PIs) functionalized with benzophenone (OAA-B and OAA-BP) were synthesized successfully in two steps. In the first step, an oligo(amido amine) (OAA) was obtained via aza-Michael addition reaction between N,N'-methylene bisacrylamide and 1,4-diaminobutane. Another aza-Michael addition reaction was performed between OAA and 4-benzoylphenyl acrylate for OAA-B and also diethyl vinylphosphonate for OAA-BP in the second step. These PIs were used for polymerization of 2-hydroxyethyl methacrylate (HEMA) and HEMA: poly(ethylene glycol) diacrylate (PEGDA, $M_n=575$) (60:40 wt%) mixture using real-time FTIR spectrophotometer and photo-DSC. PI/bis-(4-tert-butylphenyl)-iodonium hexafluorophosphate (Iod) systems show high polymerization efficiencies under UV and visible light exposure due to oxidative interaction between benzophenone group and Iod and charge transfer complex (CTC) formation between Iod and amines in OAA. The mechanisms were verified by absorption, steady state photolysis, electron spin resonance and laser flash photolysis experiments. The CTC formation mechanism was also analyzed by molecular modeling studies and confirmed by reduced HOMO-LUMO gap.