

NIR-SENSITIZED CATIONIC FRONTAL POLYMERIZATION OF VINYL ETHER AND EPOXY MONOMERS

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Radical Induced Cationic frontal polymerization (RICFP) of vinyl ethers and epoxides with Near-Infrared (NIR) sensitizer has been scarcely reported in the literature. In this paper, a two-component system including cyanine as NIR sensitizer and iodonium salt as co-initiator was employed to initiate the polymerization of cationic polymerizable monomers upon 808 nm NIR laser exposure. The activities of cationic polymerizable monomers like vinyl ethers, epoxides, and oxetanes were studied using the NIR initiating system aforementioned. The aryl glycidyl ethers (E51) and vinyl ethers exhibited higher conversion than cycloaliphatic epoxide (6110) and oxetane (GR43). Additionally, a three-component system comprising NIR sensitizer, iodonium salt and thermal initiator was investigated on RICFP. Vinyl ethers showed the highest reactivity, whose velocity can reach to 2.5 cm s^{-1} compared to other kinds of cationic polymerizable monomers. Compared with other thermal initiators, AIBN could promote the RICFP of vinyl ethers. But when the monomers turned to E51 and GR43, AIBN could not work on RICFP. Meanwhile, another thermal initiator (1, 1, 2, 2-tetraphenylethanol) carrying a C–C labile showed acceptable reactivity on RICFP.