INVESTIGATION OF THE EFFICIENCY OF FREE-RADICAL AND CATONIC PHOTOINITIATORS DURING VAY PHOTOPOLYMERIZATION OF IONOGELS USING 3D PRINTING TECHNOLOGY

Dominika Krok-Janiszewska[1], Joanna Ortyl[1,2,3]

[1]Cracow University of Technology, Warszawska 24, 31-155 Cracow, Poland,
[2] Photo HiTech Ltd., Bobrzyńskiego 14, 30-348 Cracow, Poland,

Light-initiated polymerization processes are now conquering the chemical market and are used in many fields. Moreover, safe light sources such as UV-LEDs and Vis-LEDs are extending the function of these processes to medicine and dentistry. Polymerization processes based on photochemical phenomena have several advantages: significant reaction kinetics, no need for high-temperature processing, low energy consumption, and no solvents.

Recent years have shown a strong interest in polymerization carried out in ionic liquids (ILs). The first reason for this development is usually the need for *'green solvents'* to replace volatile organic compounds[1]. However, studies have shown that this is not the only reason for the development of polymerization in ionic liquids. In fact, most polymerizations carried out in ILs show an increase in polymerization rate and polymer chain length compared to polymerisation in classical organic solvents. Ionic liquids can also act as plasticizers, stabilizers, modifiers, etc., and polymer gel electrolytes can be produced by thermal polymerization of monomers in ionic liquids, leading to the formation of composite conducting materials.[2]

In the present study, the efficiency of initiation of photopolymerization in ionic liquids (ILs) by selected cationic and radical photoinitiators was investigated. Spectroscopic measurements of both the initiators used and the ionic liquids studied were carried out. The spectroscopic studies carried out included absorbance studies, photolysis of the ionic liquids and initiators, and photolysis of systems containing both the ionic liquid and the initiator. In addition, photopolymerization processes were monitored by photo-DSC and real-time FT-IR.

Practical aspects of the application of photopolymerization in ionic liquids were the reason for undertaking research into the effect of ionic liquids on the initiating ability of selected photoinitiators. Ionic liquids have been shown to affect the performance of these photoinitiators. The behaviour, and relative reactivity, of initiators varies depending on the nature of the ionic liquid. The results obtained indicate that special attention must be paid to the choice of photoinitiator when polymerization is carried out in an ionic liquid. Each formulation should have an individually selected photoinitiator.[3]

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