ONE-COMPONENT CATIONIC PHOTOINITIATORS BASED ON COUMARIN SCAFFOLD IODONIUM SALTS AS HIGHLY SENSITIVE PHOTOACID GENERATORS FOR 3D-PRINTING

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Recently, cationic photopolymerization meets with growing interest, finding new applications especially in 3D-printing [1]. These new applications create demand for new efficient photoinitiators.

Since their discovery, onium salts are widely used as single-component acid generators, enabling controlled increase of the acid concentration in the monomer, leading to its predictable polymerization. New types of onium salts were developed in recent years, but still, diaryliodonium salts are one of the most efficient photoinitiators of epoxides cationic polymerization [2]. However, their most significant drawback is poor absorption of wavelengths longer than 300 nm, limiting their use. Very promising approach to overcome this drawback is to replace one of the aryl rings with more efficient chromophore, e.g. coumarin [3].

Here, we present a group of new coumarin-based iodonium salts. All of the presented salts can act as one-component photoinitiators of cationic polymerization of epoxides, oxetanes, glycidyl, and vinyl ethers [4]. Their phenyl ring was modified with nitrile, nitro, methyl, and isopropyl groups, while coumarin chromophore remained unmodified. These modifications changed the energy of C-I bonds on both, the coumarin and the phenyl ring sides. They exhibit similar absorption properties as unmodified salt (λ_{max} = 350 nm, ε_{max} = 18500 – 20500 dm^3 mol^{-1} cm^{-1}) and maintain photolysis's desired efficiency. However, these modification changed their photoinitiating properties, which were investigated using real-time FT-IR (epoxides and vinyl ethers) and photo-DSC (oxetanes and glycidyl ethers). LEDs with emission maxima at 365 nm and 405 nm were used as a light source. Due to the growing interest in the 3D-printing, presented new iodonium photoinitiators were investigated in a 3D-printing application using acrylate/epoxide and acrylate/vinyl ether systems.

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