

PHOTO-INDUCED CATIONIC CROSSLINKING OF MODIFIED NATURAL OILS

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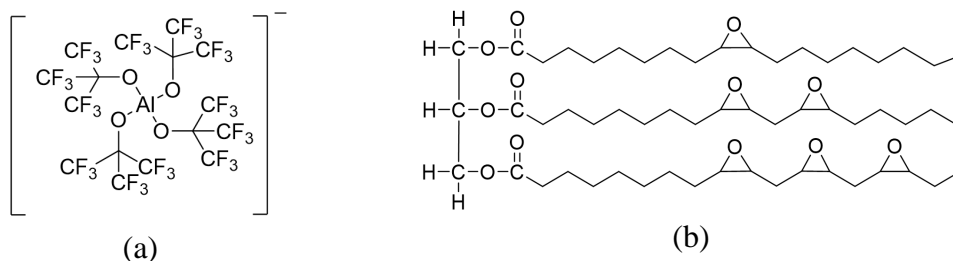
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Developments of photoinitiators, especially in the field of onium salts, have led to considerable increase of attention in recent years. Particularly the tetrakis(perfluoro-*t*-butyloxy)aluminate anion (Figure a) available as counter ion in the onium salts considerably increased research activities in the field of photoinitiators^[1,2,3].

The diphenyl-iodonium-tetrakis(perfluoro-*t*-butyloxy)aluminate (**I-AL**) showed within in series of traditional iodonium salts chosen in the presence of 1-chloro-4-propoxy-9H-thioxanthen-9-one (**CPTX**) and a 395 nm UV-LED source emitting with an intensity of 100 mW/cm² the best performance for cationic crosslinking of epoxidized linseed oil (Figure b). The reactivity was compared to conventional photoinitiators such as 4,4-diphenyl-iodonium-hexafluorophosphate (**I-HP**). Furthermore, the influence of the photoinitiator and sensitizer concentration on the reactivity of the polymerization was investigated by real-time FTIR measurements to compare the final conversion and the maximum of the polymerization rate achieved as a function of the irradiation time. This was done by quantifying the epoxy groups of the epoxidized linseed oil using baseline correction during the irradiation.

The results obtained showed that new photoinitiators such as **I-AL** in combination with **CPTX** and 395 nm UV-LED lamps also result in better cross-linking compared to low reactive initiators such as **I-HP** as concluded by the significant increase of polymerization rate and higher final conversion of the epoxy groups. The bio-based coatings derived from epoxidized linseed oil meet the requirements of the coating industry and represent an alternative to conventional radiation-curing coatings. The initiator **I-AL** possesses a good compatibility in these less polar surroundings explaining their high reactivity compared to **I-HP**.



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- [2] A. Kocaarslan, C. Kütahya, D. Keil, Y. Yagci, B. Strehmel.: „Near-IR and UV-LED Sensitized Photopolymerization with Onium Salts Comprising Anions of Different Nucleophilicities”, *ChemPhotoChem* 2019, 3, 1127-1132.
- [3] Y. Pang, A. Shiraishi, D. Keil, S. Popov, V. Strehmel, H. Jiao, J. S. Gutmann, Y. Zou, B. Strehmel, „NIR-Sensitized Cationic and Hybrid Radical/Cationic Polymerization and Crosslinking“, *Angew. Chem. Int. Ed. Engl.* 2021, 60, 1465-1473.