MICROSTRUCTURE OF EPOXIDES CURED VIA CATIONIC FRONTAL POLYMERIZATION

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Bisphenol-A diglycidyl ether (BADGE) is a widespread epoxy resin in industry used for protective coatings, adhesives, constructions, etc.. "Classical" thermal and photo curing is an energy and time-consuming process or limited to curing thin films, respectively. Nowadays these drawbacks can be overcome by the radical induced cationic frontal polymerization (RICFP) which requires minimum energy and time and is suitable for bulk curing and thin films. In addition, RICFP-based samples show a higher glass transition temperature, higher Young´s modulus, tensile strength, elongation at break and impact resistance than "classically" cured epoxy resins [1].

Aim of this study is to understand the relationship between chemical composition (ATR/FTIR), the microstructure obtained from the Positron Annihilation Lifetime Spectroscopy (PALS) and their impact on the final properties. In the case of PALS, both photo and thermal induced RICFP based samples showed lower *o*-Ps lifetime ($\tau_{o\text{-}Ps}$), narrower lifetime dispersion and reduced void fraction compared to "classical" prepared epoxides which could be key factors responsible for improved material properties [2].

Moreover, for the first time, we experimentally look at the mechanism and especially the microstructural consequences (free volume) of self-propagating thermal frontal waves during photo and thermally induced RICFP [2].

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[1] D. Bomze, P. Knaack, T. Koch, H. Jin, R. Liska, *J. Polym. Sci, Part A: Polym. Chem.*, 2016, 54, 3751-3759.

[2] H. Švajdlenková, A. Kleinová, O. Šauša, J. Rusnák, T. A. Dung, T. Koch, P. Knaack, *RSC Advances*, 2020, 10, 41098-41109.