

UV-INDUCED FRONTAL POLYMERIZATIONS FOR THE PREPARATION OF GRADIENT MAGNETIC COMPOSITES

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Frontal polymerizations/crosslinking reactions are started intentionally by a switchable stimulus such as irradiation with UV light [1]. In the course of the exothermic reactions occurring, heat is released, which in turn acts as a switch for the polymerization/crosslinking of the reactants in adjacent areas. The preparation of gradient polymer-based materials can be accomplished by an *in-situ* change of the formulation to be cured in the vicinity of the reaction zone (Figure 1).

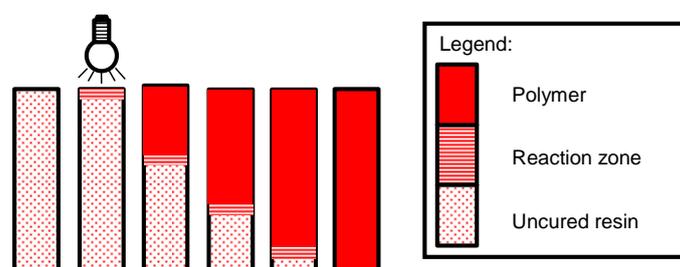


Figure 1: UV-induced frontal polymerization.

The curing of composite materials by frontal polymerizations is challenging due to the increased thermal conductivity of composite materials in comparison to the unfilled polymers [2], which facilitates energy losses. In this study, a bilateral approach, which combines the preparation and physicochemical characterization of magnetic composites with the quantification of heat losses during the curing reaction by modelling & simulation according to the finite element method [3]. Special attention was paid to the functionalization of the particle surfaces in order to avoid aggregation [4].

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[2] M. Windberger, E. Dimitriou, S. Rendl, K. Wewerka, F. Wiesbrock, *Polymers* **2021**, *13*, 65:1-65:11.

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[4] P. Marx, A.J. Wanner, Z. Zhang, H. Jin, I.-A. Tsekmes, J.J. Smit, W. Kern, F. Wiesbrock, *Polymers* **2017**, *9*, 195:1-195:16.