Investigation of curing rates of bio-based thiol-ene films from diallyl 2,5-furandicarboxylate - DTU Orbit (04/12/2018)

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The bio-based monomer, 2,5-furandicarboxylic acid, has been adapted to classic thiol-ene chemistry by derivatization of the acid with allyl alcohol. This new monomer has allowed for the synthesis of new thermoset systems, capable of forming green, sustainable materials through UV-crosslinking. In this study, the synthesis of the new monomer along with thorough kinetic studies of the new thermoset systems are presented. In order to determine kinetic values for the systems, all reactions have been followed by real-time FT-IR. Initially, a study of three different photoinitiators is performed on a classic TEMPIC-TATATO system, in order to determine the superior initiator for the new systems. The new monomer is crosslinked with five different thiol compounds in both stoichiometric and off-stoichiometric ratios, yielding an array of bio-based thermosets. The properties of these systems are determined through DSC, TGA and tensile testing, allowing determination of the systems with superior properties. In general, most systems proved to cure fully, with the exception of issues encountered from thiols with long ethoxylated chains.

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