SILYLCYCLOHEXADIENS AS ANTI OXYGEN INHIBITION AND CHAIN TRANSFER REAGENTS

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Photopolymerization has become popular in coating applications due to high curing rates with low energy requirements and avoidance of solvents. Especially light emitting diodes (LEDs) require less energy and offer longer lifetime than regular Hg-lamps. Despite of these advantages, photo-curing encounters drawbacks when performed in open air. Molecular oxygen inhibits radical polymerization, leading to insufficiently cured films with tacky surfaces. To prevent oxygen inhibition, inert gas can be used successfully. Due to the high gas consumption, anti oxygen inhibition additives are used preferably. Over the last 30 years various additives have been developed and applied.[1] Hydrogen donors such as thiols are commonly used in industry as anti oxygen inhibition and chain transfer reagent.[2] Decreased shelf life of the formulation, strong odor and reduced mechanical properties limit the usability of thiol-ene chemistry.[3]

Therefore novel hydrogen donors, based on Silyl-1,4-cyclohexadiens, have been developed and tested as anti oxygen inhibition and chain transfer reagent.

To test the new hydrogen donors, an innovative transmission FT-IR method for measuring thin layer polymerization had to be developed and optimized.

As photopolymers tend to be brittle and show low impact resistance, hydrogen donors can also be used as chain transfer reagents to achieve more homogenous networks and improve mechanical properties. Therefore photo rheological studies and mechanical tests of the resulting modified polymers were conducted.

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