

SESSION II: SPEAKER ABSTRACTS

Stimuli Responsive Polyurethanes that Rapidly Degrades *via* Anchimeric Effect

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Millions of tons of polyurethanes (PU) are produced every day for coatings, foams, and adhesives, but due to the mass production of PU there is a buildup of PU waste in landfills and the aquatic environment. Disposal of PU waste involves incineration of PU, which requires a large energy input. Therefore, there is a need to develop milder methods to degrade PU. We present a simple hydroxy acetal unit that undergoes an intramolecular cyclization mechanism under anhydrous acidic conditions leading to a breakdown into smaller units. Incorporating this moiety as a monomer in a crosslinked PU network would allow the depolymerization of the polyacetal backbone and thus provide a new class of material with a distinct degradation mechanism. Herein, the hydroxy acetal unit is incorporated into bulk polymer foam and light-triggered core shell microcapsules. The bulk tetrahydroxy acetal and toluene diisocyanate copolymer degrades efficiently under acidic conditions. Additionally, a diamino hydroxy acetal urethane monomer was synthesized for interfacial polymerization with trimesoyl chloride to obtain acid responsive microcapsules. We show that the hydroxy acetal monomer can degrade under low moisture conditions by encapsulating a photo acid generator in the hydrophobic core. The hydroxy acetal-based oil core microcapsule degrades more efficiently compared to acetal-based microcapsules without the adjacent hydroxyls.

