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Polyester Vitrimers from Biosourced Lactones[1] JACOB BRUTMAN, PAULA DELGADO, MARC HILLMYER, University of Minnesota - Twin Cities — Crosslinked polymers with controllable healing characteristics have received significant attention over the last decade. However, there is still much to be developed with these materials in the sustainability arena. Herein, we studied the healing capabilities of crosslinked bioderived poly(lactones) through Lewis acid catalyzed transesterification reactions. Materials that use isodesmic reactions (e.g., transesterification) for healing are termed vitrimers and have been reported using a diverse range of chemistries. Our initial studies focused on the healing properties of amorphous star-shaped poly((±)-lactide) crosslinked with methylenediphenyl diisocyanate in the presence of stannous(II) octoate. These materials exhibited remarkably fast stress relaxation rates when compared with previously reported polyester-based vitrimers, and exhibited similar stress relaxation rates at temperatures 140 °C lower. Furthermore, the materials were able to recover their original tensile strengths post-healing by heating the system at 140 °C for only 30 min. These results will be described in this presentation, as well as our ongoing research efforts on utilizing renewable crosslinkers, a variety of Lewis acid catalysts, and other amorphous polyesters derived from substituted lactones.

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