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Supramolecular Polymer Nanocomposites – Improvement of Mechanical Properties[1] JESSE HINRICHER, South Dakota Sch Mines & Tech, COLIN NEIKIRK, RODNEY PRIESTLEY, Princeton University — Supramolecular polymers differ from traditional polymers in that their repeat units are connected by hydrogen bonds that can reversibly break and form under various stimuli. They can be more easily recycled than conventional materials, and their highly temperature dependent viscosities result in reduced energy consumption and processing costs. Furthermore, judicious selection of supramolecular polymer architecture and functionality allows the design of advanced materials including shape memory and self-healing materials. Supramolecular polymers have yet to see widespread use because they can't support much weight due to their inherent mechanical weakness. In order to address this issue, the mechanical strength of supramolecular polymer nanocomposites based on ureidopyrmidinone (UPy) telechelic poly(caprolactone) doped with surface activated silica nanoparticles was investigated by tensile testing and dynamic mechanical analysis. The effects of varying amounts and types of nanofiller surface functionality were investigated to glean insight into the contributions of filler-filler and filler-matrix interactions to mechanical reinforcement in supramolecular polymer nanocomposites.

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