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Segmented polyurethanes containing carbon nanotube nanohybrid shishkebabs MATTHEW HOOD, Drexel University, JAMES SANDS, JOHN LASCALA, RICK BEYER, Army Research Labs, CHRISTOPHER LI, Drexel University — Segmented polyurethanes (SPUs) are linear, multiblock copolymers that possess a wide range of tailorable properties via control during synthesis and processing. Phase separation between SPU's segments produce superior elastomeric properties with hard domains maintaining the polymer matrix under stress, while soft domains provide flexibility allowing for a high degree of strain. We have synthesized a variety of SPU systems using different molecular weight macrodiol soft segments and various concentrations of hard segments, which are composed of hexamethylene diisocyanate and butanediol. SPU morphology control via tuning the hard/soft segment ratio was achieved. Furthermore, adding carbon nanotubes (CNTs) that have been periodically patterned with functionalized crystalline polymers, to form nanohybrid shishkebabs, drastically changes the mechanical properties of our SPU system even at low CNT concentrations. Differential scanning calorimetry, dynamic mechanical analysis, wide angle X-ray diffraction and transmission electron microscopy have been used to characterize these systems and compare them to neat SPU. By tailoring SPU composition and shishkebab concentration we have produced a system with significant mechanical improvement with potential for use as a shape memory polymer.

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