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Dynamics of a Novel Class of Polymers: Polymerized Sulfur¹ KEVIN MASSER, JENNY KIM, VLADIMIR OLESHKO, National Institute of Standards and Technology, JARED GRIEBEL, WOO CHUNG, ADAM SIMMONS, JEFF PYUN, The University of Arizona, CHRISTOPHER SOLES, National Institute of Standards and Technology — In this study we investigate the dynamics of a new type of polymer, consisting mainly of sulfur. Room-temperature stable polymerized sulfur samples were prepared by crosslinking the well-known living sulfur polymers formed at elevated temperatures by the addition of a crosslinking agent. This reverse vulcanization process was used to create a series of samples with different amounts of crosslinking agent. These polymers show great promise for use in advanced batteries as cathode materials. Each system exhibits a glassy-state beta relaxation, with the intensity of this relaxation proportional to the crosslinking content. A dynamic glass transition is also observed for each system, and the glass transition temperature/segmental relaxation moves to higher temperatures with increased crosslink content as is typically observed in crosslinked systems. As is typical of polymers, ion motion in these systems is closely coupled to the backbone motion of the host polymer.

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Kevin Masser National Institute of Standards and Technology

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