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Structure-Property Relationships in Tough, Superabsorbent Thermoplastic Elastomers for Hemorrhage Control FREDERICK BEYER, ERICH BAIN, TYLER LONG, RANDY MROZEK, ALICE SAVAGE, US Army Research Laboratory, HALIE MARTIN, University of Tennessee , MARK DADMUN, University of Tennessee; Oak Ridge National Laboratory, JOSEPH LENHART, US Army Research Laboratory — Between 2001 and 2009, uncontrolled hemorrhaging from major trauma accounted for the deaths of roughly 80% of wounded soldiers with potentially survivable injuries. Modern hemostatic materials are limited in their ability to deliver therapeutic agents, causing tissue damage themselves, or being difficult to remove intact. The goal of this study is to create a mechanically robust polymer that takes up as much as 1000 wt% water in seconds while maintaining sufficient toughness to be removed intact from the wound intact. A thermoplastic elastomer scaffold in which physical crosslinks provide mechanical toughness might provide an appropriate combination of fast swelling and excellent toughness if the matrix material can be engineered to be strongly hydrophilic and swell rapidly. In this work, a commercial SBS triblock copolymer has been modified with poly(acrylic acid) side chains, resulting in materials that are superabsorbent but retain good mechanical properties when saturated. Although SAXS experiments failed to show any significant changes in morphology, even with 800 wt% water uptake, preliminary SANS experiments using selectively deuterated materials and swelling with D2O show significant changes in morphology. Our most recent findings will be presented.

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