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Polycation Crosslinked Triblock Copolymer Hydrogels with High Toughness and Controllable Structures YAOYAO CHEN, KENNETH SHULL, Northwestern Univ — ABA triblock copolymers with hydrophobic endblocks [poly methyl methacrylate (PMMA)] and hydrophilic midblocks [poly methacrylic acid (PMAA)] can self-assemble into elastic hydrogels in water. This hydrogel network can be toughened by incorporating metal ions, for example, zinc ions, into swollen midblocks to form a transient network. Instead of small molecule species (e.g. zinc ions), we recently develop a new tough hydrogel system by using polycations to crosslink swollen midblocks via electrostatic interaction. The stretchability of this system is significantly increased compared to that of zinc crosslinked hydrogels due to breaking-reforming of the transient network, and the toughness is comparable to that of double network (DN) hydrogels. The incorporation of polycations with low mobility enables the self-recovery of the structure after deformation. In the meanwhile, our hydrogel structures can be easily controlled by changing polycation charge ratio and environmental conditions, such as pH and salt.

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