Steering the Properties of Stimuli-Responsive Supramolecular Polymer Networks into new Territories

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The reversible nature of supramolecular interactions between constituting building blocks permits one to temporarily disassemble supramolecular polymers (SMPs) on command by applying an appropriate stimulus. This approach has emerged as a general design strategy for the development of healable polymer systems. The framework exploits that the temporary disassembly decreases the molecular weight of linear SMPs and the cross-link density of SMP networks, and thereby causes an increase of the chain mobility and a reduction of the viscosity of such materials. Such transformations enable the disassembled materials to flow and fill defects, before the stimulus is removed and the original supramolecular polymer is re-assembled. We show that the properties of such materials can be pushed beyond the previously accessible property space by creating supramolecular metallopolymer blends of linear and branched building blocks.

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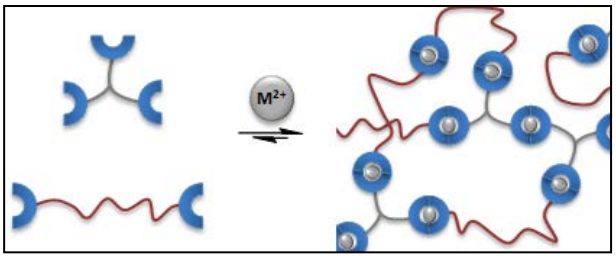

Schematic of supramolecular metallopolymer blends comprised of linear and branched building blocks.

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