Bio-Inspired Metal-Coordination Dynamics: A Unique Tool for Engineering Soft Matter Mechanics

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Growing evidence supports a critical role of metal-coordination in soft biological material properties such as self-healing, underwater adhesion and autonomous wound plugging. Using bio-inspired metal-binding polymers, initial efforts to mimic these properties with metal-coordination crosslinked polymer materials have shown promise. In addition, with polymer network mechanics strongly coupled to coordinate crosslink dynamics material properties can be easily tuned from viscoelastic fluids to solids. Given their exploitation in desirable material applications in Nature, bio-inspired metal-coordinate complex crosslinking provides an opportunity to further advance synthetic polymer materials design. Early lessons from this pursuit are presented.