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Zwitterionic Hydrogel-Biopolymer Assembly towards Biomimetic Superlubricants RAYMOND SEEKELL, ELAINE ZHU, University of Notre Dame — One superlubricant in nature is the synovial fluid (SF), comprising of a high molecular weight polysaccharide, hyaluronic acid (HA), and a globule protein, lubricin. In this bio-inspired materials research, we have explored hydrogel particles to mimic lubricin as a "ball-bearing" and control their interaction with the viscoelastic HA matrix. Biocompatible poly(N-[2-(Methacyloyloxy)ethyl]dimethyl-(3-sulfopropyl) ammonium hydroxide) (PMSA) hydrogel particles are synthesized to examine the electrostatic induced assembly of PMSA-HA supramolecular complexes in aqueous solutions. Fluorescence microscopy and rheology experiments have characterized the tunable network structure and viscoelastic properties of PMSA-HA aggregates by HA concentration and ionic conditions in aqueous solution. When being grafted to a solid surface, the PMSA-HA composite thin film exhibits superior low biofouling and friction performance, suggesting great promises as artificial superlubricants.

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