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Engineering Novel Thermoreversible Hydrogels with Applications in Regenerative Medicine and Delivery Systems DIVYA BHATNAGAR, State University of New York at Stony Brook, NIKHIL MEHANDRU, Harvard University, JAPBANI NANDA, W. Tresper Clarke High School, YICHENG SUN, Mission San Jose High School, MIRIAM RAFAILOVCH, State University of New York at Stony Brook — A major concern in regenerative medicine is the increasing need for effective biomaterials for scaffolds, cell delivery vehicles, and drug delivery systems. In this study, we engineered a thermo reversible composite hydrogel of hard, medium and soft stiffness by blending Pluronic F127 (F127) with biocompatible hyaluronic acid (HA) and bioadhesive gelatin. Rheological analysis demonstrated that hard gel produced the highest elastic modulus in both HA-F127 and Gelatin-F127 hydrogels. It was found that increasing the concentration of HA and gelatin increased the critical solution temperature (CST) at which the solution gels. Glucose and sodium chloride, additives commonly found within the body, were analyzed to have minimal effect on the mechanical properties but caused a decrease in CST. Adult human dermal fibroblasts were plated on the composite hydrogels to demonstrate scaffolding and cell delivery. The highest growth was observed in hard Gelatin-F127 hydrogels. Cells also showed the best response to hard Gelatin-F127 gels in shear modulation force microscopy and were found to be homogenously distributed in the three-dimensional matrix of the gels. Our novel composite hydrogel displayed synergistic properties of its individual components and had the necessary characteristics for effective use in the medical setting: mechanical strength, cell adhesion and viability.

Divya Bhatnagar
State University of New York at Stony Brook

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