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Anomalous Composition-Dependent Swelling Behavior of Photocrosslinked VP/AA Copolymeric Hydrogels J. HANNAH LEE, DAVID BUCKNALL, School of Polymer, Textile and Fiber Engineering, Georgia Institute of Technology — We are investigating the swelling behavior and network structure of vinylpyrrolidone (VP)/acrylic acid (AA) copolymeric hydrogels synthesized using ultraviolet (UV) initiated polymerization. The goal of this work is to develop hydrogels with large expansion volumes but low expansion rates for use in tissue expander applications. In a number of reports, hydrogels composed of VP and AA units have shown that with increasing AA content higher equilibrium swelling ratios (q_e) are produced. This behavior is due to higher osmotic pressure induced by the dissociation of carboxyl groups in the AA units into carboxylate anions and hydrogen ions during the swelling. In contrast, in our UV-cured system we found that the value of q_e showed a distinct maximum at approximately 50 wt% AA. This anomalous swelling behavior has been studied by measuring the modulus and investigating swelling kinetics as a function of AA content, in addition to the composition and thermal analysis of the dried VP/AA gels. These measurements provide detail of the effective crosslink density as well as weight between crosslinks for these hydrogels. From these results we propose a model which describes this anomalous behaviour based on the molecular chain structure of the hydrogels.

J. Hannah Lee
Georgia Institute of Technology

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