

Abstract Submitted  
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**Nonlinear behavior of ionically and covalently cross-linked alginate hydrogels** SEYEDMEYSAM HASHEMNEJAD, MAHLA ZABET, SANTANU KUNDU, Dave C. Swalm School of Chemical Engineering, Mississippi State University, MS State, MS — Gels deform differently under applied load and the deformation behavior is related to their network structures and environmental conditions, specifically, strength and density of crosslinking, polymer concentration, applied load, and temperature. Here, we investigate the mechanical behavior of both ionically and covalent cross-linked alginate hydrogel using large amplitude oscillatory shear (LAOS) and cavitation experiments. Ionically-bonded alginate gels were obtained by using divalent calcium. Alginate volume fraction and alginate to calcium ratio were varied to obtain gels with different mechanical properties. Chemical gels were synthesized using adipic acid dihydrazide (AAD) as a cross-linker. The non-linear rheological parameters are estimated from the stress responses to elucidate the strain softening behavior of these gels. Fracture initiation and propagation mechanism during shear rheology and cavitation experiments will be presented. Our results provide a better understanding on the deformation mechanism of alginate gel under large-deformation.

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