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Effect of a functional polymer on the rheology and microstructure of sodium alginate

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Abstract

Here, we report on the effect of functional copolymer poly(N-isopropylacrylamide-co-4-vinylphenylboronic acid) (NIBA) on the rheology and network structure formed by sodium alginate (SA) through linear and nonlinear viscoelasticity measurements. The hydrogel moduli at pH 3 increased with increasing NIBA addition, while the yield point decreased. Furthermore, these hydrogels showed strain-softening behavior, weak G'' -overshoot marking the onset of nonlinearity, and good self-healing properties after large deformation. The zero-strain nonlinearity parameter (Q_0) was found to be more sensitive to NIBA-addition than the linear viscoelastic properties. The blends showed a clear peak in the startup test except for SA alone and the peak intensity increased with increasing NIBA-concentration. Finally, based on all data, gelation mechanism and interaction of SA and NIBA will be clarified.

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