

Abstract Submitted
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Modeling polymer gel that strengthen under tension SANTIDAN BISWAS, VICTOR V. YASHIN, ANNA C. BALAZS, Univ of Pittsburgh — We develop a constitutive model of a responsive polymer gel, which can reversibly form additional crosslinks when under tension. We assume that the polymer chains incorporate the folded domains encompassing the reactive functional groups (cryptic sites). Under extension of the network, the domains unfold and expose the cryptic sites, which can then form labile bonds with the linker chains grafted to the network. Once the deformation is removed, the linkers detach from the cryptic sites, and unfolded domains go back to the folded configuration thus hiding the cryptic sites. The gel behavior under applied force is described by the equations of elasticity of the polymer network coupled to the kinetic equations for the folding and binding transitions. The developed model could be used for designing new polymer gel-based materials that exhibit self-strengthening in response to a mechanical action.

Santidan Biswas
Univ of Pittsburgh

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