**Revisiting the Tensile Behavior of Dual Crosslinked Poly(vinyl alcohol) Gel**

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The tensile test is a crucial method for assessing the mechanical properties of polymer gels. Prior research has shown that the initial strain rate significantly influences the tensile behavior of dual crosslinked gel. However, the connection between microscopic structural evolution and macroscopic tensile behavior has yet to be better understood. For example, Mayumi et al. found that the tensile behavior is highly strain-rate dependent for dual crosslinked poly(vinyl alcohol) (PVA) hydrogel containing chemical and physical crosslinks. They also observed the normalizable reduced stress representing the typical sticky Rouse behavior, i.e., stress scale with t^-0.5. In this study, we revisit the results of Mayumi et al. by examining the linear shear rheology and the nonlinear tensile properties of the same model system studied by Mayumi et al.. Our findings indicate that the relative values of the Hencky strain rate, the sticker dissociation rate, and the terminal relaxation rate of polymer chains govern the tensile behavior during the transition from nonlinear into linear viscoelastic regimes. This transition, as shown in Figure 1, is due to the decrease of the Hencky strain rate during the tensile test with the fixed engineering strain rate. Details will be presented on-site.

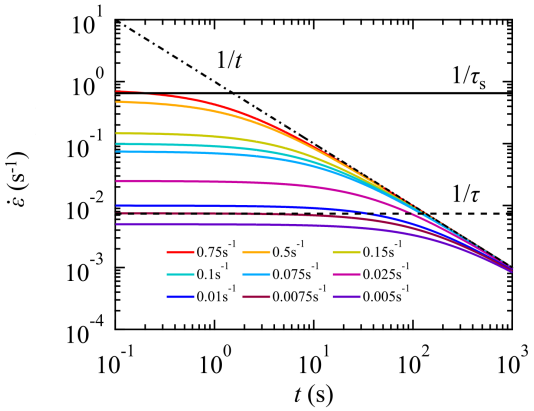


Figure 1: Predictions of time $t$ dependences of Hencky strain rate $\dot{\varepsilon}(t)$ for samples with various intial strain rates. Solid and dashed lines represent the dissociation rate of the stickers and the relaxation rate of chains near equilibrium, respectively. Dashed-dotted-dashed line represents $t$ dependence of $1/t$.

## References

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