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Sticky-sphere model for phase separation of mixtures of the eye lens proteins gamma-B and alpha crystallin: non-monotonic dependence on mutual attraction GEORGE THURSTON, MAURINO BAUTISTA, DAVID ROSS, VERN LINDBERG, HOSSEIN SHAHMOHAMAD, Rochester Institute of Technology — We apply a multi-component extension of the Baxter sticky-sphere model to aqueous solutions of the eye lens proteins gamma-B crystallin and alpha crystallin. These mixtures show liquid-liquid phase separation influenced by gamma-B/gamma-B attraction, gamma-B/alpha size disparity and gamma-B/alpha attraction. We examine the dependence of the upper-consolute spinodal temperature surface on gamma-B/alpha attraction, previously found to influence stability. Gamma-B crystallin is modeled with a temperature-dependent stickiness parameter that reproduces both static light scattering and small-angle neutron scattering near its critical point. Alpha crystallin is modeled as a hard sphere. We find that the Barboy-Tenne model shows a non-monotonic dependence of the spinodal temperature surface on gamma-B/alpha attraction that is qualitatively consistent with recent molecular dynamics simulation results. Hard-sphere or very attractive gamma-B/alpha interactions lead to instability, and the spinodal surface shows a minimum in an intermediate range of gamma-B/alpha attraction strength. We examine the nature of the two types of instability.

George Thurston
Rochester Institute of Technology

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