Self-assembly of macromolecular composites pertinent to human eye

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Chances are you know someone who wears glasses. Glass-wearers like me know very well that vision should not be taken for granted. All we have to do is to take our glasses off and the world becomes one big, disorienting blur. Problems only worsen with age. Vision is only possible through macromolecular principles, charged components, adhesion, and transfer of light and ions. The transparent vitreous is incredibly engineered. The charged polyelectrolyte hyaluronic acid (HA) network swells to maintain the pressure in the eye, while stiff collagen type II bundles help absorb any external mechanical shock. The vitreous can phase-separate and detach from the retina. This disease is poorly studied and has few treatment options. By studying biomimetic models of the vitreous in vitro, we hope to understand vision-related diseases and to formulate therapeutic materials.