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Supramolecular Gels in the Bulk and at Surfaces¹

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Responsive gels might be broadly classified into two groups: those in which the material response is mediated by a phase transition involving the cooperative behavior of many molecules, or molecule moieties, together, and those in which the material response is dictated by the behavior of individual molecular components acting independently of each other. This talk will discuss the properties of supramolecular gels as a representative of the latter class of responsive materials. In the context of this talk, supramolecular gels are solvent-swollen polymer networks in which the connections between polymer chains that define the network are due to specific, directional, and reversible 1:1 interactions between molecular partners. In such cases, the properties of the network are responsive to the same stimuli that influence the reversible interaction between the molecular partners. The magnitude and sensitivity of stimulus-responsiveness in supramolecular gels is greatest in the vicinity of the gel point, and the characteristics of the sol-gel phase transition will be described for a family of coordinatively cross-linked poly(4-vinylpyridine) (PVP) organogels. It will be shown that the cross-linking interaction can have profound effects on the mechanical properties of similar, surface-bound networks prepared from end-grafted PVP.

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