

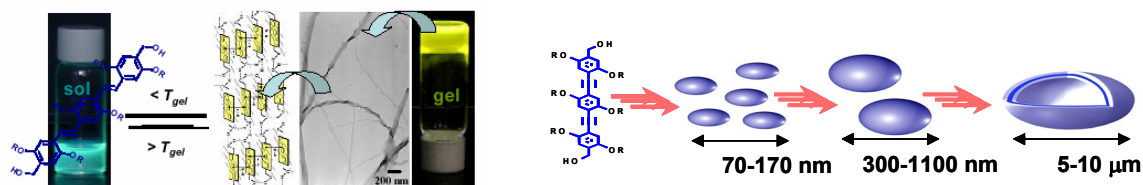
Molecular Self-assemblies of Linear π -Systems

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Chemists have been exploring the possibility of Nature's self-assembly principles to the design of artificial functional assemblies with the help of weak noncovalent interactions such as H-bonding, π -stacking and van der Waal's forces. In this endeavor, control of size, shape and properties of artificial supramolecular systems is a challenging task. In many cases, self-association of small molecules results in the formation of organogels, the properties of which are reversible due to noncovalent interactions. The diverse properties of the noncovalent architectures provided by these organogels makes them promising candidates for several potential applications ranging from cosmetics and catalysis to optoelectronics and related areas. In this context, the self-organization of linearly π -conjugated molecules and chromophores is important, particularly to the emerging field of supramolecular electronics. We have been exploring the possibility of linearly conjugated molecules to the creation of supramolecular architectures with controlled size, shape and optoelectronic properties. To this end we have been investigating the thermoreversible self-assembly and gelation of fluorescent *p*-phenylenevinylene and *p*-phenyleneethynylene derivatives.^{1,2} Self-assembly of phenylenevinylenes leads to tape-like architectures whereas phenyleneethynylenes form spherical and linear assemblies. Another goal of our studies is the creation of helical architectures of a preferred handedness. We could achieve this by incorporating a remote chiral handle to the molecular building blocks and through the transfer and amplification of molecular chirality to the self-assembly.³ We could also achieve control on the helix formation either by creating coiled or twisted helices through rational structural modifications.⁴ These gel scaffolds are examples of bio-inspired supramolecular light harvesting systems in which organization of the chromophores is crucial for the transfer of the excitation energy.⁵ We could synthesize a variety of donors and acceptors that self-organize to form organogels which are useful as artificial light harvesting assemblies with tunable emission properties.⁶ Details of these studies will be discussed.



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