

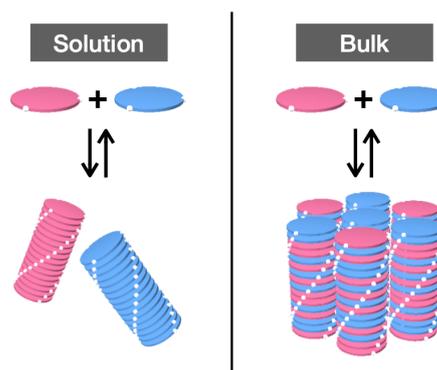
Formation and Structural Characterization of Supramolecular Copolymers in Liquid Crystalline Phase

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Keywords: Supramolecular Polymerization; Supramolecular Copolymerization; Columnar Liquid Crystal; One-Dimensional Supramolecular Assembly

Supramolecular copolymerization is a powerful tool to design supramolecular materials for emergent functions. To date, supramolecular copolymerization has been mainly studied in dilute solution, and has not been well investigated in bulk, which is more important for material applications.¹ In supramolecular polymerization in bulk, it is necessary to consider the interaction between polymer chains and spatial packing, which was unnecessary to consider in solution. Therefore, supramolecular copolymerization has been achieved only by utilizing a strong complimentary hydrogen bonding unit which enables different monomers to assemble in an alternating fashion even in bulk.²

In this study, based on our previous work on supramolecular polymerization in liquid crystalline phase,^{3,4} we report the first supramolecular copolymerization in liquid crystalline phase without utilizing complimentary hydrogen bonding units. We prepared two types of monomers having a porphyrin core, one with alkyl chains via amide groups as side chains, and the other with ethylene glycol chains instead of alkyl chains. Alkyl chains and ethylene glycol chains are incompatible with each other, but a common unit was introduced at the end of each chain to promote monomer compatibility. Each monomer alone formed supramolecular polymer both in dilute solution and in columnar liquid crystalline state. When these monomers were copolymerized, they formed self-sorted supramolecular polymers in solution, while blocky supramolecular copolymers were formed in liquid crystals. In this presentation, we will report the structural identification based on optical properties and liquid crystal phase behavior, and the difference in polymerization behavior between dilute solution and liquid crystalline state.



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