

A strategy for obtaining supramolecular polymers dispersed in single molecular width

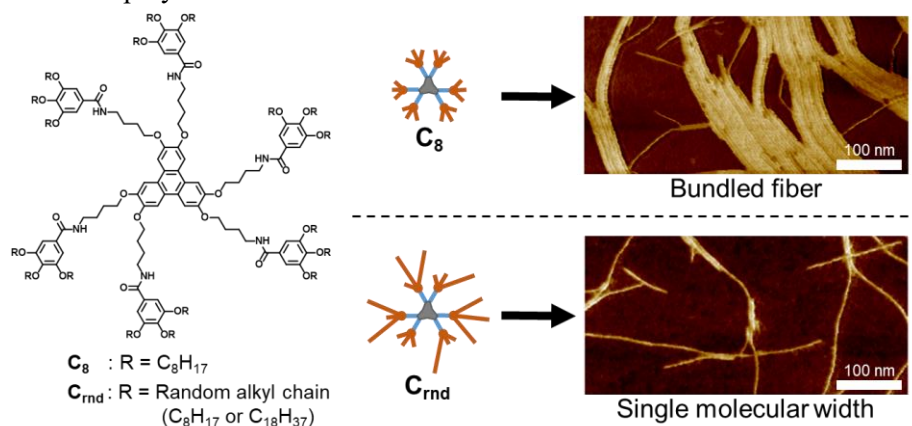
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Although a rational monomer design for controlled supramolecular polymerization has been established,¹ and higher order nanostructures such as fibers, helices, toroids, spirals, nanosheets, etc. can nowadays be created,² it is still difficult to control interaction between these nanostructures. For example, even in the simplest case of the formation of one-dimensional (1D) supramolecular polymeric chains, interchain interaction cannot be controlled, often giving rise to a heavily bundled state. As a result, highly concentrated solution of supramolecular polymers results in gels and precipitates, which hinders to investigate long-term dynamics and rheological properties of a supramolecular polymer.

In this study, we designed and synthesized two triphenylene-based monomers bearing six amide groups and eighteen alkyl chains at the periphery of the triphenylene core. In one form of the monomers (compound **C₈**), octyl chains were used as the alkyl chains, while in another form, octyl and octadecyl chains were randomly introduced to the eighteen positions (**C_{rnd}**).

We investigated the bundling of supramolecular polymers in solutions. Atomic force microscopy (AFM) measurements immediately revealed that the supramolecular polymers of **C₈** are bundled. In clear contrast, the bundling of supramolecular polymers of **C_{rnd}** was obviously suppressed. We infer that randomly introduced longer octadecyl chains decreased cohesive energies between the supramolecular polymers and/or prevented secondary nucleation at the surface of the supramolecular polymers. In the presentation, we will discuss supramolecular polymerization mechanism, and the characterization and solution properties of the supramolecular polymers of **C₈** and **C_{rnd}**.



- 1) K. Sugiyasu, *Polym. J.*, **2021**, 53, 865.
- 2) S. Datta, S. Takahashi, S. Yagai, *Acc. Mater. Res.* **2022**, ASAP.