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Self-assembly of ABC miktoarm star peptides and kinetic evolution of the supramolecular morphology YI-AN LIN, YU-CHUAN OU, ANDREW CHEETHAM, HONGGANG CUI, Johns Hopkins University — Amphiphilic peptides are versatile building blocks to engineer well-defined nanostructures. A great deal of work has shown the use of peptides to construct structures such as micelles, nanofibers, nanoribbons, or nanotubes through the rational design of peptide primary sequences. Despite amphiphilic peptides undergoing rapid self-assembly to form thermodynamically stable micellar structures, the resulting assembled morphologies are often found to slowly evolve over time. Here we report our rational design of an ABC miktoarm star peptide which comprises three immiscible domains: 1) a β-sheet adopting peptide segment with overall hydrophilicity 2) a hydrophobic hydrocarbon and 3) a hydrophobic and lipophobic fluorocarbon segment. In aqueous solution, this designed peptide can spontaneously associate into one-dimensional structures such as twisted-ribbons and helical ribbons. Transmission electron microscopy has been used to directly visualize the structural evolution with time from narrow structures into higher hierarchical large assemblies.

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