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Super Helix Formation From a Partially Charged Diblock Copolymer HANNAH K. MURNEN, ADRIANNE M. ROSALES, University of California, Berkeley, RON N. ZUCKERMANN, Materials Science Division, Lawrence Berkeley National Laboratory, RACHEL A. SEGALMAN, University of California, Berkeley — Polypeptoids, or N-substituted glycines, are a simplified biomimetic platform designed to combine attributes of biological polymers such as sequence specificity with the potential for hierarchical self assembly inherent to synthetic polymers. In this study, the aqueous self-assembly of a monodisperse partially charged amphiphilic diblock copolypeptoid is shown to result in giant super helices with diameters of approximately 615 nm and lengths ranging from 2-20 μm . These structures are highly unusual in several ways including their large size, hierarchical structure, and homochirality. Sequence specific chemical modifications coupled with x-ray scattering have led to a model of self-assembly whereby lamellar stacks roll up to produce the large supramolecular structure. In order to understand the effect of charge density and location on the self-assembly process a series of polymers were synthesized pinpointing the charge to specific chain locations and varying the overall amount of available charge. While location of the negative charges is found to have a minimal effect on the self-assembly process, charge density is shown to have an important role. This role is complex, involving both electrostatic and hydrogen bond effects.

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