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Giant super-helix formation from aqueous bioinspired block copolymers. H.K. MURNEN, A.M. ROSALES, Dept. of Chemical Engineering, University of California-Berkeley, R.N. ZUCKERMANN, The Molecular Foundry, Lawrence Berkeley National Laboratory, R.A. SEGALMAN, Dept. of Chemical Engineering, University of California-Berkeley — Polypeptoids are a class of bioinspired polymers based on N-substituted glycines with the side group bonded to the backbone nitrogen rather than the alpha carbon as in natural polypeptides. Due to the lack of backbone hydrogen bonding and the sequence specific synthesis of these materials, side chain interactions can be designed to induce the formation of macromolecular structures in aqueous solution. An amphiphilic block copolypeptoid consisting of a hydrophobic block, poly[N-(2-phenylethyl)glycine] and a hydrophilic block, poly[N-(2-carboxyethyl)glycine] is found to form giant superhelices in aqueous solution by scanning and transmission electron microscopy and atomic force microscopy. With a diameter greater than 600nm, these helices are much larger than the fully extended length of the molecules (7 nm). Furthermore, while the molecules are completely achiral, the helices are all left handed and remarkably regular (pitch 670nm, length greater than 2 microns). We will discuss possible preferential chain conformations that may provide the driving force for the superstructure.

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