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Helical cylinders or multicompartment cylinders through the solution assembly of charged block copolymers with multivalent organic counterions DARRIN POCHAN, SHENG ZHONG, University of Delaware, HONGGANG CUI, Northwestern University, ZHIYUN CHEN, Rhodia, KAREN WOOLEY, Washington U.-St. Louis — By manipulating the interaction of charged block copolymer hydrophilic corona blocks with multivalent organic counterions, and controlling the kinetics of block copolymer solution self-assembly, desired micelle geometries can be formed. Specifically, polyacrylic acid-b-polymethylacrylate-b-polystyrene amphiphilic triblock copolymers were studied in water/THF solvent mixtures with organic multiamines as counterions. By manipulating block copolymer and solvent composition, different micelle geometries were formed. However, by altering the chemical structure and/or concentration of the multiamine counterions, as well as the kinetic pathway through which the molecules are assembled, complex nanostructures were formed. An example of nanostructure from kinetic control includes spherical micelles that can be controllably assembled into 1-d multicompartment cylinders. Examples of nanostructure from control of the type and amount of multivalent organic counterion added are helical cylinder superstructures many micrometers in length. The system has been investigated by means of cryogenic transmission electron microscopy (cryo-TEM) and small angle neutron scattering (SANS).

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