Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Multigeometry Nanoparticle Engineering via Kinetic Control through Multistep assembly[1] YINGCHAO CHEN, University of Delaware, XIAOJUN WANG, University of Tennessee, KE ZHANG, Northwestern University, FUWU ZHANG, Texas A&M University, JIMMY MAYS, university of tennessee, KAREN WOOLEY, Texas A&M University, DARRIN POCHAN, University of Delaware — Organization of block copolymers into complicated multicompartment (MCM) and multigeometry (MGM) nanostructures is of increasing interest. Multistep, co-assembly methods resulting in kinetic control processing was used to produce complex nanoparticles that are not obtained via other assembly methods. Vesicle-cylinder, separate vesicle and cylinder, disk-cylinder, and mixed vesicle nanoparticles were constructed by binary blends of distinct diblock copolymers. Initially, the vesicle former polyacrylic acid-polyisoprene and cylinder former polyacrylic acid-polystyrene which share the same hydrophilic domain but immiscible hydrophobic domain were blended in THF. Secondly, dimaine molecules are added to associate with the common hydrophilic PAA. Importantly, and lastly, by tuning the kinetic addition rate of selective, miscible solvent water, the unlike hydrophobic blocks are kinetically trapped into one particle and eventually nanophase separate to form multiple compartments and multigeometries. The effective bottom-up multistep assembly strategies can be applied in other binary/ternary blends, in which new vesicle-sphere, disk-disk and cylinder-cylinder MCM/MGM nanoparticles were programed.

[1]We are grateful for the financial support from the National Science Funding DMR-0906815 (D.J.P. and K.L.W.) and NIST METROLOGY POCHAN 2012.

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Date submitted: 15 Nov 2013 Electronic form version 1.4