Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

A Facile Method to Fabricate Double Gyroid as A Polymer Template for Nanohybrids HSIAO-FANG WANG, RONG-MING HO, Department of Chemical Engineering, National Tsing Hua University — Here, we suggest a facile method to acquire double gyroid (DG) phase from the self-assembly of chiral block copolymers (BCPs*), polystyrene-*b*-poly(L-lactide) (PS-PLLA). A wide region for the formation of DG can be found in the phase diagram of the BCPs*, suggesting that helical phase (H*) from the self-assembly of BCPs* can serve as a stepping stone for the formation of the DG due to an easy path for order-order transition from two-dimensional to three-dimensional (network) structure. Moreover, the order-order transition from metastable H* to stable DG can be expedited by blending the PS-PLLA with compatible entity. Moreover, PS-PLLA blends are prepared by using styrene oligomer (S) to fine-tune the morphologies of the blends at which the molecular weight ratio of the S and compatible PS block (r) is less than 0.1. Owing to the use of the low-molecular-weight oligomer, the increase of BCP chain mobility in the blends significantly reduces the transformation time for the order-order transition from H* to DG. Consequently, nanoporous gyroid SiO_2 can be fabricated using hydrolyzed PS-PLLA blends as a template for sol-gel reaction followed by removal of the PS matrix.

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Date submitted: 12 Nov 2014 Electronic form version 1.4