

13TH INTERNATIONAL CONFERENCE ON

ADVANCED MATERIALS AND NANOTECHNOLOGY

OCTOBER 26-28, 2017 OSAKA, JAPAN

Orientation controlled gyroid structure thin films by substrate interactions in solvent vapor annealingYeongsik Kim¹, Sungmin Park¹, Wooseop Lee¹, Su-Mi Hur² and Du Yeol Ryu¹¹Yonsei University, Republic of Korea²Chonnam national University, Republic of Korea

A well-defined 3D bicontinuous network structure in nanoscopic regular array has attracted considerable attention because of its potential applications such as photonic crystals, meta-materials, energy devices and superconductor. In this study, the asymmetric polystyrene-block-poly (methyl methacrylate) (PS-b-PMMA) thin films on the two different substrate with high-molecular-weight were prepared to be exposed a neutral solvent vapor to generate a hexagonal (HEX) cylindrical morphology to long-range ordered Gyroid (GYR). The interfacial interaction by different substrate interaction induced the two distinct GYR, [211] and [111] planes, which were directed from cylinders, like the parallel and perpendicular orientation on the selective and neutral substrate, respectively. Moreover, we further performed coarse-grained simulations of a block copolymer model to provide the molecular mechanisms. Our results based on experiments and simulations suggest a simple route for the controlled and well-defined GYR structures.

Biography

Yeongsik Kim is currently a PhD candidate at Yonsei University, Republic of Korea. He has published numerous research papers and articles in reputed journals and has various other achievements in the related studies. He has extended his valuable service towards the scientific community with his extensive research work.

kim.yeongsik@yonsei.ac.kr

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