

Fall 11-9-2015

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Rong Ho

National Tsinghua University, rmho@mx.nthu.edu.tw

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Recommended Citation

1. H.-Y. Hsueh, H.-Y. Chen, C.-K. Chen, R.-M. Ho, S. Gwo, S. Akasaka, H. Hasegawa *Nano Lett.* 10, 4994 (2010) 2. H.-Y. Hsueh, Y.-C. Huang, R.-M. Ho, C.-H. Lai, T. Makida, H. Hasegawa *Adv. Mater.* 23, 3041 (2011). 3. H.-Y. Hsueh, H.-Y. Chen, Y.-C. Hung, Y.-C. Ling, S. Gwo, R.-M. Ho *Adv. Mater.* 25, 1780 (2013). 4. H.-Y. Hsueh, Y.-C. Ling, H.-F. Wang, L.-Y. Chang Chien, Y.-C. Hung, E. L. Thomas, and R.-M. Ho *Adv. Mater.* 26, 3225 (2014). Front Cover Story 5. H.-Y. Hsueh, C.-T. Yao, R.-M. Ho *Chem. Soc. Rev.*, 44, 1974 (2015).

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Well-Ordered Nanohybrids and Nanoporous Materials from Block Copolymer Templates

Rong-Ming Ho

*Department of Chemical Engineering, National Tsing Hua University, Hsinchu 30013, Taiwan
e-mail address: rmho@mx.nthu.edu.tw*

The design of nanostructured materials and their corresponding morphologies has attracted intense attention. Although many technologies have been explored to fabricate nanostructured materials, templated synthesis is one of the most important approaches to fabricate nanostructured materials with precisely controlled structures and morphologies from their constituent components. Here, we aim to use the self-assembly of block copolymers as an emerging and powerful tool to fabricate well-defined nanomaterials with precise control over the structural dimensions and shape, as well as over the composition and corresponding spatial arrangement. The fabrication of well-ordered nanoporous polymers from the self-assembly of degradable block copolymers, in particular with gyroid-forming network morphologies, as templates for the syntheses of various materials with different entities. Different templated syntheses are developed for the fabrication of nanohybrids and nanoporous materials. By taking advantage of the well-ordered structural characteristics of the gyroid texture, the properties and applications of 3D regular nanostructures, such as catalytic, photonic behavior and optical properties of gyroid-forming nanostructures, are demonstrated.

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