

Planar ordering of sub-5 nm dendrimer cylinders using line patterns with high resolution and high aspect ratio

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Directed self-assembly (DSA) of soft materials such as block copolymers, colloids, liquid crystals, and supramolecules has been received considerable attention to produce highly periodic nanostructures. Among soft materials that can be oriented by DSA techniques, supramolecular structures have merits due to small feature size (2–10 nm), various chemical functionalities, and fast self-assemble time (~mins). This study exhibits planar ordering of dendrimer cylinders over large-area with DSA methods. Continuous alignment of dendrimer cylinders that have small feature size (~4.75 nm) was generated over large-area by topographical patterns with high resolution (~20 nm) and high aspect ratio (>10). According to the theoretical and experimental studies, physical surface anchoring and geometrical anchoring affected to the alignment direction of dendrimer cylinders. These approaches demonstrate the significant steps to develop the fabrication of sub-5 nm nanostructures based on DSA of supramolecules.