

Selective Staining of Homeotropically Aligned Supramolecular Structure with a Small Feature Patterns

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Soft materials have been widely studied for bottom-up lithography. Among them, supramolecules attract attention due to its advantageous properties, small feature size, fast construction time and so on. By these reasons, supramolecules can be promising candidate for opto-electronic devices. Selective fixation, which selectively fixing the parts of molecule, is needed for making periodic nanopatterns. However, it is still challenging due to its tiny feature sizes.

Here we use dendrimers (D1), make it homeotropically aligned and selectively staining the core part, finally inorganic post structures are obtained. D1 are self-assembled to the cylindrical structure, polyvinyl alcohol (PVA) top coating and thermal annealing make dendrimers vertically aligned. Subsequently, staining the core part using ruthenium tetroxide (RuO₄). Finally, thin films of homeotropically aligned cylindrical structures are obtained. Additionally, we confirmed that RuO_x are remained after calcination.

This approach provide that method for fabricating ultra-dense nanostructures using well-aligned cylindrical supramolecular structures, it can give potentials to improve bottom-up lithography based on supramolecules.