

Orientation control of supramolecular columns by photo-thermal laser heating

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Directed self-assembly of soft materials has been considered as a significant research for the generation of highly periodic nanostructures with small feature size. Among various soft materials, supramolecular structures are attractive due to their advantageous properties such as small feature size (2 - 10 nm), various chemical functionalities, and fast stabilization time (~ mins) to self-assembly. Herein, we demonstrate directed self-assembly of supramolecular columns by photo-thermal laser heating. Thermal gradient was generated from irradiation of focused laser beam onto chemically modified graphene layer. Induced thermal gradient directed the orientation of supramolecular columns with small feature size (~ 4.75 nm). By tuning the laser scanning velocity and the laser power, two different in-plane orientations and homeotropic orientation of supramolecular columns were observed. The directed self-assembly using laser photo-thermal annealing can be applied for orienting supramolecular structures with different phases and dimensions, then the creation of various shaped nanostructures with high-resolution and high periodicity will be expected.