High-χ Bio-Based Block Copolymers for Self-Assembled Nano-Lithography

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The development of processes for the fabrication of nanoscale devices at low cost and greater functionality is a daily challenge for the semiconductor industry.

The self-organization at the nano-meter scale of block copolymers (BCPs) thin films has attracted a considerable attention as an alternative approach of overcoming the feature size limitation of the conventional lithography processes used in semiconductor industry. A new class of bio-hybrid BCPs comprising a naturally occurring oligosaccharide conjugated to a synthetic block has been recently synthesized and has revealed a sub-nano organization in thin film with 5-10nm features.

A step further consisted in designing oligosaccharide-b-silicon containing block which will be used as an etch mask for subsequent pattern transfer in nano-lithography applications. The obtained morphologies, pitches and feature sizes have been confirmed by various characterization techniques (SAXS, GISAXS, XRR, AFM and SEM). 3D long-range order thin films of these bio-hybrids BCPs have to be generated and should be reached by direct self-assembly (DSA) using short thermal time annealing.

Key words: High-χ; block copolymer; directed self-assembly; graphoepitaxy

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