Directed Self Assembly Method using Removable Templates
Technology #15434

Applications

- Semiconductor Fabrication: Via patterning
- Biotechnology: Templating of biomolecules
- Nanotechnology: Nanowire and nanotube growth
- Computational Materials Science
- Photonics: sub wavelength photon devices
- Electronics: circuit fabrication for devices.
- Thermally driven self assembly systems

Problem Addressed

Shrinking the size of transistors for integrated circuits is a primary concern for the semiconductor fabrication industry. However, standard micro and nanoscale fabrication techniques such as photolithography and scanning electron-beam lithography are limited by low throughput or the challenges of increasing the numerical aperture without a reduction of light source intensity. A promising solution to overcoming these limitations is to use block copolymers assembled using a background template.

Technology

The proposed technology is a method for augmenting directed self-assembly through the removal of physical templating features. In the procedure, the physical template is first constructed using electron beam lithography applied to a silicon substrate. Next, a thin film of block copolymers is spin coated over the substrate filling in the outline provided by the template spaces. Then a carbon tetrafluoride and oxygen reactive ion etch is used to remove the top of the spin coated layer and the taller features of the template. Finally, using directional etching the pattern is transferred to a desired substrate. In all, the fundamental step of removing the template allows the templated block copolymer to be used as a functional pattern without interference from the physical templating features.

Advantages

- Fewer steps than other fabrication methods which allows for faster production and reduced costs
- Removing physical template mitigates potential imperfections and defects
- Elimination of physical template allows the entire space can be filled with pattern
- Only a single material is left as an etch mask for pattern transfer resulting in more uniform transfer

Categories For This Invention:
- Electronics & Circuits
- Semiconductors & Integrated Circuits

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Publications:
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