Materials & Chemicals

Improved Nansocale Patterning by Directed Assembly of Triblock Copolymers

View U.S. Patent No. 9,372,398 in PDF format.

WARF: P110137US02

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method for fabricating nanostructures of various feature dimensions on a single substrate by directing the assembly of ABA triblock copolymers.

Overview

Advances in nanoscale science and engineering have driven the fabrication of two- and three-dimensional structures with unprecedented precision. Cutting-edge progress in electronics, photonics and cell studies will continue to be measured in nanometers.

Yet traditional patterning methods such as photo and electron beam lithography are limited in the asymmetric and increasingly small features that they can form.

The Invention

UW–Madison researchers have developed fabrication methods that involve directing the assembly of ABA triblock copolymers to form desired, complex features. In the process, a layer or thin film of the copolymer material is deposited on a nanopatterned surface and induced to separate, thus replicating the pattern in the layer. Chemical patterns with periods much different than the natural period of the ABA triblock copolymer may be used to direct the assembly process. The triblock includes a component from a polymer group that includes polystyrene (PS) and polyethylene oxide (PEO).

Applications

- Nanolithography
- Manufacturing semiconductor devices, integrated circuits and hard drives
- Manufacturing cell-based assays with nanochannels and nanopores
- Nanoprinting
- Developing photovoltaic cells and the next generation of flat screen displays

Key Benefits

- The structure of the middle B block allows the triblock to assemble on patterns with periods much larger than the copolymer's natural period.
- Domain widths can be tuned to form asymmetric features, like bends.
- Nanostructures can be formed with various feature dimensions simultaneously on the same substrate.
- No complications by an added C block
- No degrading of uniformity or other pattern qualities by diblock polymer blends

Additional Information

Related Technologies

- WARF reference number P06066US describes methods for fabricating complex three-dimensional structures by directing self-assembling materials.

Tech Fields

- Materials & Chemicals : Polymers
- Semiconductors & Integrated Circuits : Lithography

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842