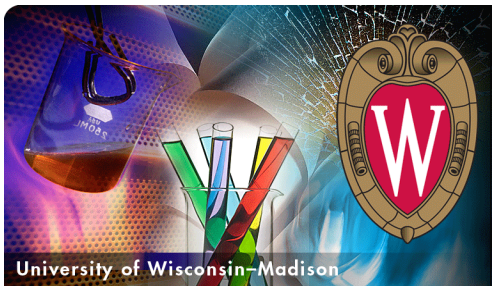

Block Copolymers for Sub-10 Nanometer Lithography

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WARF: P140025US01

View U.S. Patent No. 9,587,136 in PDF format.

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing block copolymers that can self-assemble into domains having very small dimensions.

OVERVIEW

Block copolymer (BCP) lithography is one of the most powerful technologies of the digital electronics era, allowing millions of nanoscale components to be fabricated on a single chip.

BCPs are made of two chemically distinct polymer chains linked together. Due to this bond, BCPs can self-assemble into a variety of nanostructures. In the self-assembly process, the most critical factors that govern domain size are the degree of polymerization (N) and Flory-Huggins interaction parameter (χ), which is a measure of interaction strength.

A high χ value is needed to achieve small, ordered BCPs. One type of material with a high χ value is polyhydroxystyrene (PHS). Unfortunately, the process of bonding to PHS degrades many other useful polymer blocks.

THE INVENTION

UW–Madison researchers have developed BCPs characterized by high Flory-Huggins interaction parameters (χ). They can self-assemble into domains having very small dimensions, and therefore are extremely useful in lithography.

The new BCPS may be polymerized from PHS monomers or from *tert*-butyl styrene and 2-vinylpyridine monomers. Overall degree of polymerization (N) can be experimentally controlled so that it's high enough to form a desired phase (e.g., cylinders, spheres, lamellae, etc.) but low enough to produce very small dimensions.

THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.

APPLICATIONS

- BCP lithography
- Fabricating semiconductor devices, integrated circuits, transistors, hard disk drives and display technologies

KEY BENEFITS

- New BCPS have high Flory-Huggins interaction parameters (at least .15) and low overall degrees of polymerization.
- Enables extremely small dimensions (smaller than 10 nm)
- Can utilize polyhydroxystyrene (PHS)

STAGE OF DEVELOPMENT

The development of this technology was supported by WARF Accelerator. WARF Accelerator selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones. WARF believes that these technologies are especially attractive opportunities for licensing.

ADDITIONAL INFORMATION

Related Portfolios
WARF Accelerator Program Technologies

Related Technologies
WARF reference number P09005US describes a photopatternable layer for controlling block copolymer microdomain orientation.
WARF reference number P100296US02 describes a method for direct patterning in block copolymer lithography.

Tech Fields
Materials & Chemicals - Polymers
Semiconductors & Integrated Circuits - Lithography
Semiconductors & Integrated Circuits - Design & fabrication

CONTACT INFORMATION

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