



Degradable Neutral Layer for BCP Lithography

[View U.S. Patent No. 8,999,623 in PDF format.](#)

WARF: P130174US01

Inventors: Padma Gopalan, Daniel Sweat, Jonathan Choi, Myungwoong Kim

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing crosslinked copolymer film that cleaves under relatively mild conditions.

Overview

The lithographic process is one of the most powerful technologies of the digital electronics era. Lithography allows hundreds of millions of components to be fabricated on a single chip with pattern features as small as 50 nanometers.

Block copolymer (BCP) lithography can achieve even smaller features. BCPs use a template to self-assemble into well-defined, highly regular nanostructures. To be consistent and useful, it is critical to control the orientation of BCP microdomains on substrates. To do this, the BCP lithography process commonly uses a 'neutral layer' made of random copolymers.

Unfortunately, this adds another layer that must be bored through and removed. This may leave undesirable residues and require strong etchants that can damage the underlying substrate.

The Invention

UW-Madison researchers have developed easier-to-cleave neutral layers using a new type of polymer film. Linkages both within the film, as well as between the film and its substrate, may be cleaved apart using only a mild acid or light ('photocleaving').

The film is made of random copolymer chains having crosslinkable functional groups. The film can be coated on a BCP substrate and then selectively removed.

Applications

- Nanopatterning in the microelectronics industry
- Integrated circuits, display technology and media storage
- Degradable hydrogels and soft scaffolds

Key Benefits

- Neutral layer can be readily removed.
- Avoids harsh techniques like reactive ion etching
- Does not disturb the underlying substrate or overlying template
- Cleavage occurs within minutes.
- Enables the use of materials such as graphene

Additional Information

For More Information About the Inventors

- [Padma Gopalan](#)

Related Technologies

- [WARF reference number P100296US02 describes a method for direct patterning in block copolymer lithography.](#)

Publications

- Sweat D.P., Kim M., Yu X. and Gopalan P. 2013. A Single-Component Inimer Containing Cross-Linkable Ultrathin Polymer Coating for Dense Polymer Brush Growth. Langmuir. 29, 3805-3812.

Tech Fields

- [Materials & Chemicals : Polymers](#)
- [Semiconductors & Integrated Circuits : Lithography.](#)

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846