NEW METHODS TO GENERATE 10-TERABIT-PER-SQUARE-INCH ARRAYS OF NANOSCOPIC ELEMENTS WITH LONG-RANGE LATERAL ORDER

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ABSTRACT

Researchers at the University of Massachusetts Amherst and the University of California at Berkeley have recently developed novel methods to produce block copolymer thin films containing near perfectly ordered arrays of nanoscopic elements on macroscopic non-flexible or flexible substrates. The long-range lateral order of the block copolymer nanoscopic elements is achieved by using substrates with saw-tooth patterns to guide the copolymer self-assembly. The block copolymer thin films produced using saw-tooth patterned substrates have areal densities of nanocylinders in excess of 10 terabits per square inch, and can be easily processed to generate templates with long-range lateral order of nanopores for a wide variety of commercial applications.

APPLICATIONS

Ultrahigh-density addressable media, electronic devices, opto-electronic devices, photovoltaic devices

ADVANTAGES

Ultradense arrays: The self-assembly of block copolymers on the patterned substrates generates arrays of nanoscopic elements having areal densities in excess of 10 trillion bits per square inch, at least an order of magnitude over current capabilities.

Long-range lateral order: The saw-tooth substrate topography provides directional guidance to the self-assembly of block copolymers, resulting in perfectly oriented and laterally ordered arrays of nanocylinders over arbitrarily large substrate surfaces. sign of flexible, solid-state storage media.

High substrate versatility: Perfectly ordered ultradense arrays from block copolymers can be formed on both hard/non-flexible substrates and soft/flexible substrates for various end-use applications.

Simple and environmentally friendly processes: The ?bottom-up? fabrication processes eliminate the use of environmentally unfriendly harsh chemicals required by lithographic techniques. All of the processing steps are non-disruptive and can be easily incorporated into the current production lines.

Flexible surfaces: Addressable media is no longer restricted to perfectly rigid substrates, opening unique opportunities for the design of flexible, solid-state storage media.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9335629	05/10/2016	2009-089
United States Of America	Issued Patent	8247033	08/21/2012	2009-089

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OTHER INFORMATION

RELATED CASES

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