

Nanomotor Based Fabrication and Patterning of Defined Nanostructures

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BACKGROUND

High-throughput and low-cost techniques for fabrication at sub-50nm scale on wide area substrates are currently a very active and competitive field of cross-disciplinary R&D. Of the recent crop of nanofabrication technologies, dip-pen nanolithography (DPN) is notable for its success in serving the nanofabrication needs of biotechnology, advanced materials, and nano-scale devices. In DPN, molecules in an “ink” are transferred from a coated atomic force microscopy tip to a substrate, forming a pattern as the tip is scanned. DPN however has the disadvantages of slow processing and patterning of small areas and limited parallelization capabilities.

TECHNOLOGY DESCRIPTION

UC San Diego researchers have developed methods and devices for fabricating or patterning nanostructures on surfaces using nanomotors. In one example, catalytic nanowire motors move along predetermined paths to fabricate nano-objects in the presence of the relevant reaction precursors and a catalyst confined to the motor surface. Guided motion of the functionalized nanomotors, enabled by electric or magnetic fields or other means, thus leads to localized reaction in specific locations along the nanomotor path and the ‘writing’ of predetermined nanofeatures. The invention is in proof-of-concept stage but is broad and applicable to different nanomotors and the deposition of a wide range of materials. Relative to DPN, the invention essentially replaces the tip with a nanomotor. With the “pen” thus liberated from the rest of the writing machine and endowed with greater versatility, the invention overcomes DPN’s disadvantages and introduces new capabilities, e.g., simultaneous patterning of multiple lines using several nanomotors and creation of patterns with different heights using on-demand speed control.

INTELLECTUAL PROPERTY INFO

This technology has a patent pending and is available for sponsorship and/or licensing.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,352,963	05/31/2016	2009-391

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OTHER INFORMATION

KEYWORDS

nanofabrication, nanomotor,
nanolithography, nanomaterials,
nanobiotechnology, dip-pen
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CATEGORIZED AS

- **Biotechnology**
 - Other
- **Materials & Chemicals**
 - Nanomaterials
- **Nanotechnology**
 - Electronics
 - Materials
 - NanoBio
 - Tools and Devices

RELATED CASES

2009-391-0, 2010-207-1, 2010-003-1