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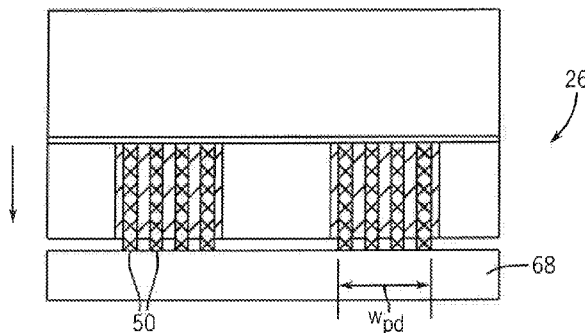
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(54) Title: METHOD TO PRODUCE NANOMETER-SIZED FEATURES WITH DIRECTED ASSEMBLY OF BLOCK COPOLYMERS

FIG. 17



(57) Abstract: Methods for fabricating stamps and systems for patterning a substrate, and devices resulting from those methods are provided.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/032564

A. CLASSIFICATION OF SUBJECT MATTER INV. G03F7/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) G03F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/091752 A1 (NEALEY PAUL F [US] ET AL) 15 May 2003 (2003-05-15)	1-11
Y	paragraphs [0021] - [0024], [0048] - [0052]; claims 26,36	12-17
Y	US 2006/134556 A1 (NEALEY PAUL F [US] ET AL) 22 June 2006 (2006-06-22)	1-17
Y	paragraphs [0003] - [0005], [0009], [0010], [0014], [0045], [0078], [0096], [0098]	
Y	US 2007/175859 A1 (BLACK CHARLES T [US] ET AL) 2 August 2007 (2007-08-02)	1-11
A	paragraphs [0074], [0077], [0080]; claims 1-8	12-17
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents :		
A document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family		
Date of the actual completion of the international search 22 July 2009		Date of mailing of the international search report 07/10/2009
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Thiele, Norbert

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/032564

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004/256662 A1 (BLACK CHARLES T [US] ET AL) 23 December 2004 (2004-12-23)	1-11
A	paragraphs [0041], [0046], [0047], [0094] - [0132], [0142], [0143]; claims 1,8,10,11,17-19,22,24,30	12-17
A	US 6 713 238 B1 (CHOU STEPHEN Y [US] ET AL) 30 March 2004 (2004-03-30) column 2, line 40 - column 3, line 15; claims 1,3,6-9,11,15-18	1-17
A	WANG C ET AL: "One step fabrication and characterization of platinum nanopore electrode ensembles formed via amphiphilic block copolymer self-assembly" ELECTROCHIMICA ACTA, ELSEVIER SCIENCE PUBLISHERS, BARKING, GB, vol. 52, no. 2, 25 October 2006 (2006-10-25), pages 704-709, XP025168094 ISSN: 0013-4686 [retrieved on 2006-10-25] the whole document	1-17
P,X	WO 2008/145268 A (KARLSRUHE FORSCHZENT [DE]; WALHEIM STEFAN [DE]; SCHIMMEL THOMAS [DE];) 4 December 2008 (2008-12-04) page 7, lines 9-16; claims 1,5-8 page 10, line 10 - page 11, line 5 page 11, line 21 - page 12, line 16	1-17
P,X	WO 2008/130847 A (MICRON TECHNOLOGY INC [US]; MILLWARD DAN B [US]) 30 October 2008 (2008-10-30)	1-11
P,Y	paragraphs [0002] - [0006], [0028], [0031] - [0034], [0064], [0080], [0081]; claims 35-39	12-17
P,Y	WO 2008/156977 A (MICRON TECHNOLOGY INC [US]; MILLWARD DAN B [US]; WESTMORELAND DONALD [US]) 24 December 2008 (2008-12-24) paragraphs [0018] - [0020], [0023], [0028] - [0031], [0037], [0040] - [0043], [0047], [0048], [0051]; claims 1,6,7,16-18,26	1-17
P,Y	WO 2008/096335 A (YEDA RES & DEV [IL]; JOSELEVICH ERNESTO [IL]; GABAI RACHEL [IL]; ISMAC) 14 August 2008 (2008-08-14) page 3, lines 5-17; claims 1,2,12,26-28,38,39; figures 1,4,5,10,11 page 83, line 31 - page 84, line 2	1-17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/032564

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-17

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-17

Stamp comprising a substrate and a self-assembled block copolymer film, wherein one block should have an affinity for and should be swellable by absorption of a not further defined "ink chemical", whereas the second block should not have an affinity for and should not be swellable by absorption of said not further defined "ink chemical"; a method of forming the stamp and a method of using the stamp is included.

2. claims: 18-24

Stamp comprising a transparent material section transmitting radiation, and a surface having a polymerizable material thereon, and a method using such stamp for transferring the polymerizable material to a substrate and polymerizing the polymerizable material on the substrate by irradiating through the transparent section.

3. claims: 25-32

Method of forming a self-assembled block copolymer material by contacting a block copolymer material with a stamp having hydrophilic and hydrophobic areas of a width corresponding to the L_0 value of the block copolymer and annealing to cause self-assembly; and a method for forming the stamp.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2009/032564

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