

## PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

# PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

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Date of mailing (day/month/year) <b>15 NOVEMBER 2007 (15.11.2007)</b>
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Applicant's or agent's file reference UWOTL129683	<b>FOR FURTHER ACTION</b> See paragraph 2 below
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International application No. <b>PCT/US2007/072038</b>	International filing date (day/month/year) <b>25 JUNE 2007 (25.06.2007)</b>	Priority date(day/month/year) 23 JUNE 2006 (23.06.2006)
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International Patent Classification (IPC) or both national classification and IPC  <b>H05K 1/18(2006.01)i, H05K 3/30(2006.01)i</b>
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Applicant <b>UNIVERSITY OF WASHINGTON et al</b>
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1. This opinion contains indications relating to the following items:
- Box No. I Basis of the opinion
  - Box No. II Priority
  - Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - Box No. IV Lack of unity of invention
  - Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - Box No. VI Certain documents cited
  - Box No. VII Certain defects in the international application
  - Box No. VIII Certain observations on the international application
2. **FURTHER ACTION**  
If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.
- If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.  
For further options, see Form PCT/ISA/220.
3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR  Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Date of completion of this opinion 15 NOVEMBER 2007 (15.11.2007)	Authorized officer KIM, Jong Hee Telephone No.82-42-481-8500	
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WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2007/072038

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :
  - the international application in the language in which it was filed
  - a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
2.  This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:
  - a. type of material
    - a sequence listing
    - table(s) related to the sequence listing
  - b. format of material
    - on paper
    - in electronic form
  - c. time of filing/furnishing
    - contained in the international application as filed.
    - filed together with the international application in electronic form.
    - furnished subsequently to this Authority for the purposes of search.
4.  In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

**PCT/US2007/072038**

**Box No. II Priority**

1.  The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43bis.1 and 64.1) is the claimed priority date.
  
2.  This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
  
3. Additional observations, if necessary:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

**PCT/US2007/072038**

**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-31	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-31	NO
Industrial applicability (IA)	Claims	1-31	YES
	Claims	None	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 5,824,186 A (John Stephen Smith et al.) 20 October 1998

D2: US 7,007,370 B2 (David H. Gracias et al.) 07 March 2006

D1 relates to a method and apparatus for assembling microstructures onto a substrate through fluid transport.

D2 relates to a technique for self assembly of macro-scale objects, optionally defining electrical circuitry as well as articles formed by self assembly.

**A. Novelty**

Claims 1-20 provide a method for assembling a plurality of microcomponents onto a template. The method comprises the steps of: fabricating a template, immersing the template in a heated liquid, placing at least some of the plurality of microcomponents into the heated liquid, and cooling an alloy, which are not described in documents D1 and D2.

Claims 21-31 provide a method of assembling a plurality of microcomponents onto a template. The method comprises the steps of: fabricating a template, immersing the template in liquid, placing the first microcomponents into the liquid, heating the liquid, and cooling the template, which are not described in documents D1 and D2.

Therefore, the subject matter of claims 1-31 is considered to be novel under PCT Article 33(2).

**B. Inventive Step**

Claim 1 discloses a method for assembling a plurality of microcomponents onto a template. The method comprises the steps of: fabricating a plurality of microcomponents of more than one type, wherein each type of microcomponent has distinct shape, and further wherein each of the microcomponents have metal pads; fabricating a template having a plurality of recessed binding sites; immersing the template in heated liquid that is hotter than the alloy melting temperature; placing at least some of the plurality of microcomponents into the heated liquid; and cooling an alloy.

D1 is regarded as being the closest prior art to the subject matter of claim 1. It discloses the method of assembling microstructures onto a substrate through fluid transport (abstract, Figures 3, 6-12, 21, column 7-8, column 11-12, column 22 line 22-34). In particular, it includes a step of transferring shaped blocks (19,95,127,300,303,305) via fluid onto the top surface of the substrate having recessed

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of :

**Box No. V**

binding sites(55, Figure 21).

The subject matter of claim 1 differs from D1 in the steps of immersing the template in a heated liquid, placing at least some of the plurality of microcomponents into the heated liquid, and cooling the alloy. However, D2 discloses the steps of immersing the template in a heated liquid, placing at least some of the plurality of microcomponents into the heated liquid, and cooling the alloy(Figures 1-3, column 7 line 59 ~ column 8 line 52).

Therefore, a skilled person can easily make the invention of claim 1 by simply combining D1 and D2.

Claims 2-20 are dependent on claim 1 and describe the detailed method for assembling a plurality of microcomponents onto a template. However, a skilled person can make the invention of claims 2-20 by combining D1 and D2.

Claim 21 discloses a method of assembling a plurality of microcomponents onto a template comprising the steps of: fabricating a plurality of first microcomponents having a first shape and a metal pad interconnect; fabricating a template with a plurality of recessed binding sites; immersing the template in a liquid; placing the first microcomponents into the liquid; heating the liquid to a temperature greater than the melting temperature of the low melting temperature alloy; and cooling the template.

D1 is regarded as being the closest prior art to the subject matter of claim 21. It discloses the method for assembling microstructures onto a substrate through fluid transport(abstract, Figures 3, 6-12, 21, column 7-8, column 11-12, column 22 line 22-34). In particular, it includes a step of transferring shaped blocks(19,95,127,300,303,305) via fluid onto a top surface of the substrate having recessed binding sites(55, Figure 21).

The subject matter of claim 21 differs from D1 in the steps of heating the liquid to a temperature greater than the melting temperature of the low melting temperature alloy, and cooling the template. Also, claim 21 is different from claim 1 in the step of heating the liquid after the steps of immersing the template in liquid and placing the first microcomponents into the liquid, which can be easily invented by a skilled person from D2. A skilled person can easily make the invention of claim 21 by simply combining D1 and D2.

Claims 22-31 are dependent on claim 21 and describe the detailed method of assembling a plurality of microcomponents onto a template. However, a skilled person can make the invention of claims 22-31 by combining D1 and D2.

Therefore, the present claims 1-31 can not be regarded as involving an inventive step under PCT Article 33(3).

**C. Industrial Applicability**

The subject matter of claims 1-31 is considered to be industrial applicable under PCT Article 33(4).