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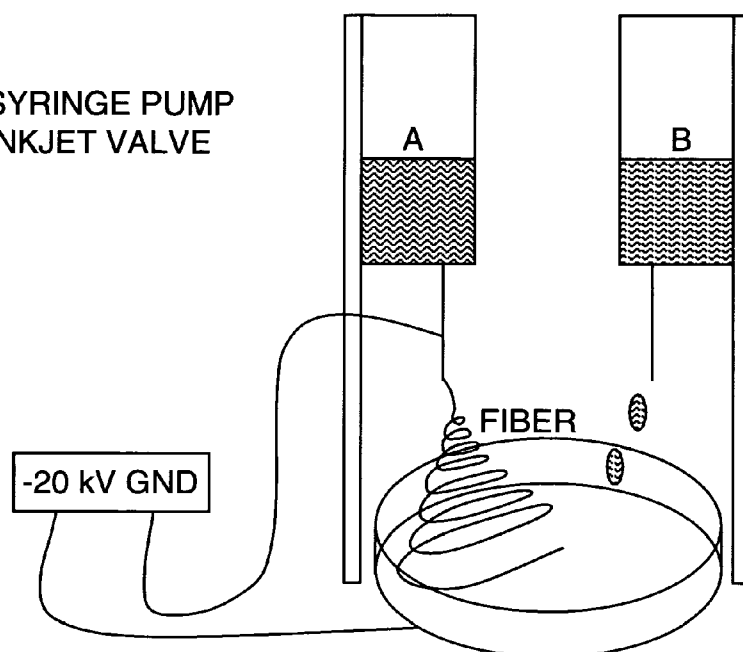
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[Continued on next page]

(54) Title: INKJET PRINTING OF TISSUES AND CELLS

A: SYRINGE PUMP  
B: INKJET VALVE



**FIG. 1**

(57) Abstract: Provided herein is an apparatus for printing cells which includes an electrospinning device and an inkjet printing device operatively associated therewith. Methods of making a biodegradable scaffold having cells seeded therein are also provided. Methods of forming microparticles containing one or more cells encapsulated by a substrate are also provided, as are methods of forming an array of said microparticles.



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# INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/000940

## A. CLASSIFICATION OF SUBJECT MATTER

INV. D01D5/00 D01F6/62 A61F2/06 A61L27/38 B41J2/01

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)

D01D D01F A61F A61L B41J

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. |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Y         | WO 2004/108418 A1 (UNIV CLEMSON [US]; BOLAND THOMAS [US]; WILSON JR W CHRIS [US]; XU TAO)<br>16 December 2004 (2004-12-16)<br>page 12, line 1 - line 4<br>examples<br>claims | 11-29                 |
| A         |                                                                                                                                                                              | 1-10                  |
| Y         | WO 2007/024125 A1 (UNIV EWHA IND COLLABORATION [KR]; LEE SEUNG JIN [KR]; HAN SOL [KR]; SH)<br>1 March 2007 (2007-03-01)<br>claims                                            | 11-29                 |
| E         | WO 2009/051701 A2 (UNIV WAKE FOREST HEALTH [US]; UNIV WAKE FOREST [US]; CARROLL DAVID L [])<br>23 April 2009 (2009-04-23)<br>page 23, line 5 - line 15                       | 11-29                 |
| -/--      |                                                                                                                                                                              |                       |

☒ Further documents are listed in the continuation of Box C.

☒ 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

16 July 2009

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# INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/000940

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                                                     | Relevant to claim No. |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| A         | WO 2007/120840 A2 (UNIV WAKE FOREST HEALTH [US]; UNIV WAKE FOREST [US]; LEVI NICOLE [US];) 25 October 2007 (2007-10-25)<br>page 2, line 1 - line 10<br>-----                                                                                                                                                                           | 1-29                  |
| A         | WO 2007/124023 A2 (UNIV WAKE FOREST HEALTH [US]; YOO JAMES [US]; XU TAO [US]; ATALA ANTHO) 1 November 2007 (2007-11-01)<br>claims<br>-----                                                                                                                                                                                             | 1-29                  |
| T         | FULLHASE C ET AL: "A NOVEL HYBRID PRINTING SYSTEM FOR THE GENERATION OF ORGANIZED BLADDER TISSUE"<br>JOURNAL OF UROLOGY, LIPPINCOTT WILLIAMS & WILKINS, BALTIMORE, MD, US,<br>vol. 181, no. 4,<br>1 April 2009 (2009-04-01), pages 282-283,<br>XP026008854<br>ISSN: 0022-5347 [retrieved on 2009-03-18]<br>the whole document<br>----- | 1-29                  |

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2009/000940

## 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.:

1-29

### 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: 1-29

Apparatus for printing cells, method for making a  
biodegradable scaffold, biodegradable scaffold and its use  
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2. claims: 30-50

Method of forming microparticles or arrays of microparticles  
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2009/000940

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| WO 2004108418 A1                          | 16-12-2004          | US 2004237822 A1           | 02-12-2004          |
| WO 2007024125 A1                          | 01-03-2007          | CA 2621206 A1              | 01-03-2007          |
|                                           |                     | CN 101272814 A             | 24-09-2008          |
|                                           |                     | EP 1917048 A1              | 07-05-2008          |
|                                           |                     | JP 2009507530 T            | 26-02-2009          |
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|                                           |                     | US 2008233162 A1           | 25-09-2008          |
| WO 2009051701 A2                          | 23-04-2009          | US 2009117087 A1           | 07-05-2009          |
| WO 2007120840 A2                          | 25-10-2007          | NONE                       |                     |
| WO 2007124023 A2                          | 01-11-2007          | US 2009208466 A1           | 20-08-2009          |