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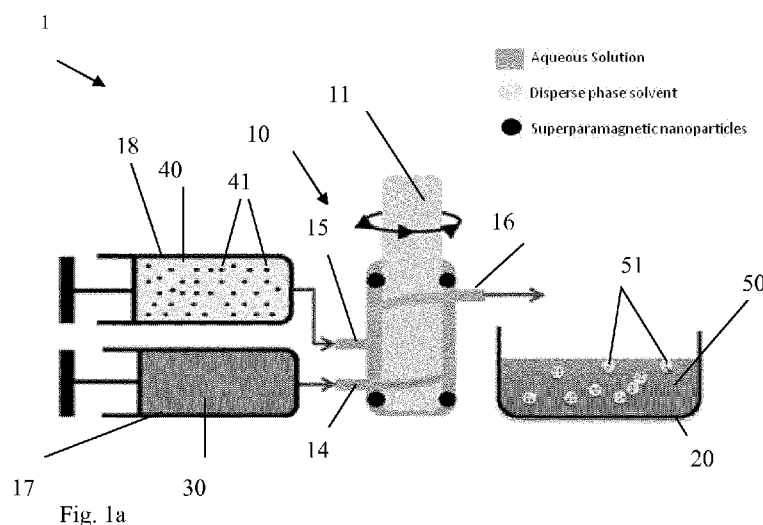
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Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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27 February 2014

(54) **Title:** MICROPARTICLES AND A SYSTEM AND METHOD FOR THE SYNTHESIS OF MICROPARTICLES

(57) **Abstract:** There is provided a method of producing microparticles using an emulsion based synthesis route including: Providing a first fluid phase and a second fluid phase, wherein the first fluid phase is a continuous phase and the second fluid phase is a dispersed phase comprising a dispersed material, wherein the continuous phase is immiscible with the dispersed phase; Mixing the first continuous phase and the second dispersed phase in the presence of a surfactant in a shear device to form an emulsion of droplets of controllable size and having a narrow drop size distribution; Drying the emulsion to form microparticles of controllable size and having narrow size distribution, and wherein the microparticles may comprise spherical, crumpled, dimpled, porous or hollow microparticles morphology. Also provided is a system including shear device and drying arrangement. Also provided are microparticles of controllable size and morphology formed by the method.

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2013/061302

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61K9/50 B01J13/04
ADD.

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)

A61K B01J

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 practicable, search terms used)

EP0-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 2007/172426 A1 (LEE GIL U [US] ET AL) 26 July 2007 (2007-07-26) paragraphs [0002], [0009] - [0015], [0038], [0041], [0044], [0051], [0057] - [0065], [0085] - [0090], [0174] ----- -/--	1-62



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 application or patent 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

21 October 2013

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INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2013/061302

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/204533 A1 (WINCHESTER GARY [US] ET AL) 25 August 2011 (2011-08-25) paragraphs [0008], [0029] - [0032], [0037], [0042], [0078], [0079], [0085], [0088] figures 2a-c -----	1-11, 17-19, 22-24, 27-35, 39,41, 42,46, 47, 49-56, 59-62
X	US 2009/311295 A1 (MATHIOWITZ EDITH [US] ET AL) 17 December 2009 (2009-12-17) paragraphs [0002], [0011], [0020], [0037], [0051], [0052], [0056] - [0062], [0067] - [0071] example 2 -----	1-7, 9-18, 22-32, 34-46, 55,56,62

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2013/061302

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 all searchable 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.:

1-62

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.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/061302

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007172426	A1	26-07-2007	EP 1945271 A2 23-07-2008
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			CN 102985175 A 20-03-2013
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			WO 2008054874 A2 08-05-2008

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-62

a method for producing microparticles comprising the steps of (i) providing a continuous phase and a dispersed phase, (ii) mixing the continuous phase and the dispersed phase in the presence of a surfactant in a shear device to form an emulsion of droplets and (iii) drying the emulsion to form microparticles

2. claims: 63-72

spherical, crumpled, dimpled, porous or hollow microparticles with substantially uniform size or relatively uniform size distribution

3. claims: 73-84

superparamagnetic microparticles

4. claims: 85-88

a shear mixing device

5. claims: 89-94

a drying bath

6. claims: 95-108

a method for producing microparticles comprising the steps of (i) preparing a primary emulsion and (ii) evaporating the solvent to form microparticles

7. claims: 109, 110

porous or hollow microparticles having a high surface area to volume ratio
