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Published:

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(88) Date of publication of the international search report:  
8 March 2007

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: NANOPARTICLES WITH INORGANIC CORE AND METHODS OF USING THEM

(57) Abstract: An aspect of the invention includes a nanoparticle including a substantially monodisperse inorganic core with a surface and a coating substantially covering the surface of the substantially monodisperse inorganic core, wherein the coating includes of at least coating structure I, II, or III wherein the nanoparticle is substantially non-agglomerated and has diameter in a range from about 1nm to about 100 nm. An aspect of the invention also encompasses a method of making a substantially non-agglomerated nanoparticle having a diameter in a range from about 1nm to about 100 nm including a substantially monodisperse inorganic core with a surface and a coating substantially covering the surface of the substantially monodisperse inorganic core, wherein the coating comprises coating structure I, II, or III. An aspect of the invention also encompasses various methods of using the substantially non-agglomerated nanoparticle having a diameter in a range from about 1nm to about 100 nm including a substantially monodisperse inorganic core with a surface and a coating substantially covering the surface of the substantially monodisperse inorganic core, wherein the coating comprises coating structure I, II, or III.



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**INTERNATIONAL SEARCH REPORT**

International application No  
**PCT/US2005/011110**

**A. CLASSIFICATION OF SUBJECT MATTER**  
**INV. A61K49/18**

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**

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, PAJ, EMBASE, BIOSIS**

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	MORNET S ET AL: "A method for synthesis and functionalization of ultrasml superparamagnetic covalent carriers based on maghemite and dextran" JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 293, no. 1, May 2005 (2005-05), pages 127-134, XP004882968 ISSN: 0304-8853 the whole document	20-33, 37,38, 40-42, 45,46, 48-58
X	US 5 916 539 A (PILGRIMM ET AL) 29 June 1999 (1999-06-29)  column 7; claims 1-12	20-33, 37,38, 40-42, 45,46, 48-58

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

**22 September 2006**

Date of mailing of the international search report

**05.01.2007**

Name and mailing address of the ISA/

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**ESTANOL, I**

## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2005/011110

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ZHANG Y ET AL: "Surface modification of superparamagnetic magnetite nanoparticles and their intracellular uptake" BIOMATERIALS, ELSEVIER SCIENCE PUBLISHERS BV., BARKING, GB, vol. 23, no. 7, 1 April 2002 (2002-04-01), pages 1553-1561, XP004348166 ISSN: 0142-9612 figures 1,2	20-33, 37,38, 40-42, 45,46, 48-58
X	----- US 4 554 088 A (WHITEHEAD ET AL) 19 November 1985 (1985-11-19)  column 7, paragraph 7.10 - column 19	20-33, 37,38, 40-42, 45,46, 48-58
A	----- US 6 254 852 B1 (GLAJCH JOSEPH L ET AL) 3 July 2001 (2001-07-03) column 3 - column 4	1-58
T	----- US 3 652 761 A (HOWARD H. WEETALL) 28 March 1972 (1972-03-28) the whole document -----	1-58

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2005/011110

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2005/011110

## Box 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 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 fee, this Authority did not invite payment of any additional fee.
  
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.:

see annex

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- 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: 20-33, 37-38, 41-24, 45-46, 48-58

Nanoparticle comprising an inorganic core and a coating comprising a compound of formula II or III, process for its preparation, composition containing said nanoparticle, magnetic resonance imaging contrast agent comprising said nanoparticle, a method for improving resolution of an MR image using said MRI contrast agent comprising said nanoparticle, method for obtaining an MR image using said MRI contrast agent comprising said nanoparticle and a method of diagnosis using said MRI contrast agent comprising said nanoparticle.

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2. claims: 1-19, 34-36, 39-40, 43-44, 47

Nanoparticle comprising an inorganic core and a coating comprising a compound of formula I, process for its preparation, composition containing said nanoparticle, magnetic resonance imaging contrast agent comprising said nanoparticle, a method for improving resolution of an MR image using said MRI contrast agent comprising said nanoparticle, method for obtaining an MR image using said MRI contrast agent comprising said nanoparticle and a method of diagnosis using said MRI contrast agent comprising said nanoparticle.

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