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EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,
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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

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))

(88) Date of publication of the international search report:

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(54) Title: GREEN SYNTHESIS OF NANOMETALS USING PLANT EXTRACTS AND USE THEREOF

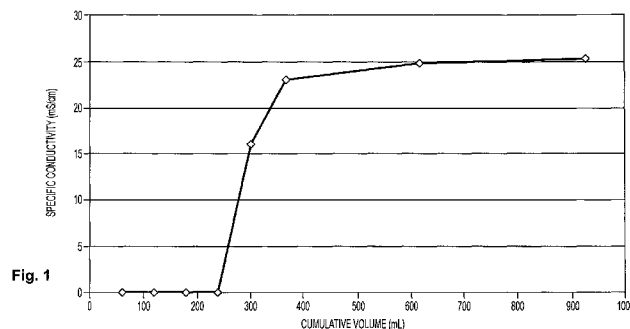


Fig. 1

(57) Abstract: The present invention relates to methods of making and using and compositions of metal nanoparticles formed by green chemistry synthetic techniques. For example, the present invention relates to metal nanoparticles formed with solutions of plant extracts and use of these metal nanoparticles in removing contaminants from soil and groundwater and other contaminated sites. In some embodiments, the invention comprises methods of making and using compositions of metal nanoparticles formed using green chemistry techniques.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/044402

A. CLASSIFICATION OF SUBJECT MATTER

INV. B22F1/00 B22F9/24 B82B1/00

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)

B22F B82B

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, COMPENDEX, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 2009/042228 A (VERUTEK TECHNOLOGIES INC [US]; HOAG GEORGE E [US]; COLLINS JOHN [US]) 2 April 2009 (2009-04-02) figure 5; examples 4-6	1-44, 83-85
X	WO 2005/095031 A (COUNCIL SCIENT IND RES [IN]; SASTRY MURALI [IN]; AHMAD ABSAR [IN]; SHA) 13 October 2005 (2005-10-13) page 5, line 21 - page 7, line 22; examples 1-6	1-44, 83-85

☒ 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

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"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

4 November 2009

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12/04/2010

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/044402

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JAE YONG SONG ET AL: "Rapid biological synthesis of silver nanoparticles using plant leaf extracts" BIOPROCESS AND BIOSYSTEMS ENGINEERING, SPRINGER, BERLIN, DE, vol. 32, no. 1, 26 April 2008 (2008-04-26), pages 79-84, XP019658638 ISSN: 1615-7605 the whole document	1-44, 83-85
X	SHANKAR S S ET AL: "Controlling the optical properties of lemongrass extract synthesized gold nanotriangles and potential application in infrared-absorbing optical coatings" CHEMISTRY OF MATERIALS 20050208 AMERICAN CHEMICAL SOCIETY US, vol. 17, no. 3, 8 February 2005 (2005-02-08), pages 566-572, XP002542349 the whole document	1-44, 83-85

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/044402

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.:

see annex

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/US2009 /044402

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-44,83-85

A method of making metal nanoparticles and a composition comprising a nanoparticle prepared according to the method

2. claims: 45-65,86-89

A composition comprising zero valent nanoparticles and a plant extract, using the composition and a device comprising the nanoparticles.

3. claims: 66-81

A method for reducing the concentration of a contaminant in a medium

4. claim: 82

A determination method

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2009/044402

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 2009042228	A	02-04-2009	NONE	
WO 2005095031	A	13-10-2005	NONE	