PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2009/007549	24.11.2009	24.11.2008

International Patent Classification (IPC) or both national classification and IPC
INV. G21B3/00

Applicant
PIANTELLI SILVIA

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 43*bis*.1(a)(i) with regard to novelty, inventive step and 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 usually 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 notifed the International Bureau under Rule 66.1*bis*(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:	Date of completion of this opinion	Authorized Officer
European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	see form PCT/ISA/210	Capostagno, Eros Telephone No. +31 70 340-3221

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IB2009/007549

Box No. I Basis of the 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 sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ 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 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:

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

1. Statement

Novelty (N)	Yes:	Claims	1-15
	No:	Claims	
Inventive step (IS)	Yes:	Claims	4, 9-12
	No:	Claims	1-3, 5-8, 13-15
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: WO 95/20816 A1 cited in the application

D2: DE 40 24 515 A1

D3: DATABASE AZONANO.COM (Retrieved on 20.10.2009) - 2 August 2005 (2005-08-02), "Fuel Cell, Energy Storage and Solar Energy Applications for Nanomaterials and Nanoparticles" XP002551718 retrieved from HTTP:// WWW.AZONANO.COM/DETAILS.ASP?ARTICLE ID=1339

D4: DATABASE NANOWORD.NET retrieved on 20.10.2009 "CLUSTER" XP002551719 retrieved from HTTP://WWW.NANOWORD.NET/LIBRARY/ DEFGEN/ GEN ERATE.PHP?TERMID=146

1 The present application does not meet the criteria of patentability, because the subject - matter of claims 1, 3, 5, 6, 8, 13, 14 does not involve an inventive step.

1.1 The document D1 is regarded as being the closest prior art to the subject - matter of claim 14, and it discloses (see fig. 2; the references in parentheses applying to this document):

An energy generator suitable for obtaining energy from nuclear reactions of hydrogen and a transition metal, said generator comprising

- an active core (1) comprising a predetermined amount of crystals of said transition metal;

- a generation chamber (2) containing in use the active core (1);

- a means (9) for heating the active core (1) in the chamber (1) up to a temperature higher than a predetermined critical temperature (page 8, par. 2);

- a means for triggering said nuclear reactions of the transition metal and hydrogen (page 8, par. 3 - page 13, par. 1);

- a means (page 13, par. 2) for removing from the chamber (1) the heat developed during the reactions in the active core (1).

1.2 The subject-matter of claim 14 therefore differs from this known energy generator in that the active core comprises a determined quantity of crystals of the transition metal, wherein such crystals are micro/nanometric clusters having a determined structure, said clusters comprising an average number of atoms of the transition metal less than a predetermined number of atoms.

The subject-matter of claim 14 is therefore new.

1.3 The problem to be solved by the present invention may therefore be regarded as to enhance the hydrogen diffusion into a host metal lattice.

1.4 The solution proposed in claim 14 of the present application cannot be considered as involving an inventive step for the following reasons.

The use of transition-metal crystals composed of microsized or nanosized atom clusters can strongly enhance the rate of diffusion of hydrogen (isotopes) within the material. This enhancement is strongly dependent of the specific physical/chemical features of the micro/nanoclusters and their state of aggregation (see for example D4). The capture of hydrogen (isotopes) by the atoms of the clusters can give rise to a sequence of nuclear reactions with energy release, as a function of the cluster size, i.e. the number of atoms in the cluster.

The solution proposed in claim 14 of the present application has features that create the conditions for a large absorption of hydrogen ions available for activating nuclear reactions within the crystalline material with consequent generation of extractable energy, the quantity of energy being proportional to the quantity of crystals.

However, these features have already been employed for the same purpose in a similar energy generator (see document D2, cited passages. See also D3 as an example). It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply these features with corresponding effect to an energy generator according to document D1, thereby arriving at an energy generator according to claim 14.

The subject-matter of claim 14 cannot therefore be considered as involving an inventive step.

1.5 The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claim 1, which therefore is also considered not inventive.

1.6 Dependent claims 3, 5, 6, 8, 13 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of inventive step, because their technical features are disclosed by D2 (claims 3, 5, 6) and D1 (claims 8, 13), the corresponding passages being cited in the search report.

2 Dependent claims 2, 7, 15 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of inventive step, because the step of cleaning the substrate before starting the process, as well as the proportionality between extractable power and quantity of crystals, should be considered as obvious by the skilled person.

3 The combination of the features of dependent claims 9-11 is neither known from, nor rendered obvious by, the available prior art.

Re Item VIII

4 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3 (b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

5 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

6 Claims 1 and 14 are not clear.

The statement "...clusters having a (pre) determined crystalline structure" is vague and unclear and it leaves the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject-matter of said claims unclear.

The same applies to the expression "removing heat **according to a determined power**".

The same applies to the expression "...clusters comprising an average number of atoms [...] less than a predetermined number of atoms". Moreover, if the meaning of such expression is that the properties of the nanoclusters vary with the number of atoms in the cluster, and the enhancement of the hydrogen capture cannot take effect beyond or beneath a given cluster size, it cannot be considered as inventive, since it is a well known situation (see for example D4, first paragraph).

7 In the description (page 3, lines 9-14), it is said that "the number of atoms that form each cluster is the variable through which the predetermined power can be obtained" and that "the power that can be obtained is substantially independent from the cluster size, i.e. the number of atoms that form the cluster".

This apparent contradiction should be clarified.