Title: PASSIVATED METAL NANOPARTICLES HAVING AN EPOXIDE-BASED OLIGOMER COATING

Abstract: This invention provides metal nanoparticles (e.g., aluminum, chromium, iron and magnesium) having an epoxide-based oligomer coating, compositions thereof, method of making the same, and methods of use thereof, including for energy related applications.
INTERNATIONAL SEARCH REPORT

INT. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B32B 5/16; C08F 130/04; C07F 19/00 (2012.01)
USPC - 428/403; 526/241; 556/27

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)

IPC(8) - B32B 5/16, C08F 130/04, C07F 19/00 (2012.01)
USPC - 428/403; 526/241; 556/27

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Patents, Non-Patent Literature. USPC - 977/773; 977/788; 977/90. Search term delimited.

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

USPTO-PubWEST; FPO; Google Scholar. Search terms: alane-amine; aluminim; binder; chromium; coated; copper; cr; cu; energy; epoxide; epoxy; f; fuel; glycidyl; glycol; iron; magnesium; metal; metallic; mg; nanomaterial; nanoparticle; nanosphere; nm; oligomer; oxide; particle; particulate; polymer; polypropylene; propylene; resin

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 2005/0074551 A1 (Huang et al.) 07 April 2005 (07.04.2005), Fig.1; para [0006]-[0010], [0034], [0052], [0074]</td>
<td>1, 2; 4(1), 4(2), 5(1), 5(2)</td>
</tr>
<tr>
<td>X</td>
<td>US 2008/0020317 A1 (Park et al.) 24 January 2008 (24.01.2008), para [0032], [0047], [0076], [0077]</td>
<td>1, 2</td>
</tr>
<tr>
<td>Y</td>
<td>US 2007/02721 12 A1 (Nielsen et al.) 29 November 2007 (29.11-2007), Fig. 3; para [0018], [0021], [0023], [0024]</td>
<td>1-3</td>
</tr>
<tr>
<td>Y</td>
<td>US 2003/0224152 A1 (Yokoyama et al.) 04 December 2003 (04.12.2003), para [0008], [0023], [0032], [0045], [0055]</td>
<td>33-43</td>
</tr>
<tr>
<td>Y</td>
<td>GB 2,248,853 A (Jones et al.) 22 April 1992 (22.04.1992), Abstract</td>
<td>34</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

* 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 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

  "I" 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

Date of the actual completion of the international search: 12 March 2012 (12.03.2012)

Date of mailing of the international search report: 28 MAR 2012

Name and mailing address of the ISA/US

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Facsimile No. 571-273-3201

Authorized officer: Lee W. Young

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PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)
**INTERNATIONAL SEARCH REPORT**

**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. 6-32
   - because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**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:

1. □ As a) 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 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.:

**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.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)