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[Continued on next page]

(54) Title: VOLTAGE SWITCHABLE DIELECTRIC MATERIAL CONTAINING CONDUCTIVE CORE SHELLED PARTI-
CLES

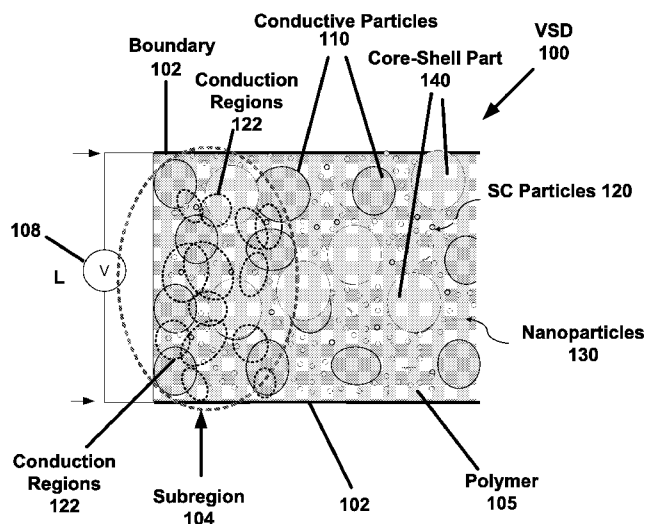


FIG. 1

(57) Abstract: A composition of voltage switchable dielectric (VSD) material that comprises a concentration of core shelled particles that individually comprise a conductor core and a shell, the shell of each core shelled particle being (i) multilayered, and/or (ii) heterogeneous. As depicted, VSD material 100 includes matrix binder 105 and various types of particle constituents, dispersed in the binder in various concentrations. The particle constituents of the VSD material may include a combination of conductive particles 110, semiconductor particles 120, nano-dimensioned particles 130 and/or core shelled particles 140. In some implementations, the core shelled particles may substitute for some or all of the conductive particles. As an alternative or variation, the VSD composition may omit the use of conductive particles, semiconductor particles, or nano-dimensioned particles, particularly with the presence of a concentration of core shelled particles. Thus, the type of particle constituent that are included in the VSD composition may vary, depending on the desired electrical and physical characteristics of the VSD material. For example, some VSD compositions may include conductive particles, but not semiconductor particles and/or nano-dimensioned particles (like carbon nanotube). Still further, other embodiments may omit use of conductive particles.



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— *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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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/059134

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01C7/10

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)
H01C

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	US 2009/212266 A1 (KOSOWSKY LEX [US] ET AL) 27 August 2009 (2009-08-27) paragraph [0024]; claims 1-15	1-2, 5, 8-11, 13-18, 20-22
X,P	WO 2009/026299 A1 (SHOCKING TECHNOLOGIES INC [US]; KOSOWSKY LEX [US]; FLEMING ROBERT [US]) 26 February 2009 (2009-02-26) claims 1-33	1-2, 5, 8-11, 13-18, 20-22

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

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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 88/00526 A1 (APPLIED PULSE CORP [US]) 28 January 1988 (1988-01-28) page 14, paragraph 2; figure 7 page 15, paragraph 1 page 16, paragraph 3 page 18, paragraph 3 page 26, paragraph 1; claims 16,7,10,11,13,14,18,21,24,28,31,33 -----	1-2,5, 8-11, 13-18, 20-22

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/059134

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.:

1-2, 5, 8-11, 13-18, 20-22

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-2, 5, 8-11, 13-18, 20-22

A composition of voltage switchable dielectric material comprising :
a binder
one or more type of particles dispersed,
the one or more type of particules including a concentration of core shelled particles that individually comprise a conductor core and a shell wherein the shell is multilayered and / or heterogeneous.

2. claims: 3-4

A VSD composition based on a binder and particles which are not shelled. The particles beind conductive or semi conductives.

3. claim: 6

A vsd composition based on binder core shell particles and nano dimensionned organic particles.

4. claim: 7

A VSD composition comprising core shelled particles in which particles are replaced with carbon nano tubes

5. claim: 12

A VSD composition comprising core shelled particles in which the binder is based on conductive polymer

6. claim: 19

A VSD composition comprising core shelled particles in which the shell as a complex structure and is formed from multiple layers of different materials

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Publication date	Patent family member(s)	Publication date
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