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(71) Applicant: **INVENSAS CORPORATION** [US/US];
3025 Orchard Parkway, San Jose, CA 95134 (US).

(72) Inventors: **KATKAR, Rajesh**; c/o Invensas Corporation,
3025 Orchard Parkway, San Jose, CA 95134 (US). **UZOH,
Cyprian, Emeka**; c/o Invensas Corporation, 3025 Orchard
Parkway, San Jose, CA 95134 (US).

(74) Agent: **LATTIN, Christopher, W.**; Invensas Corporation,
3025 Orchard Parkway, San Jose, CA 95134 (US).

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HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
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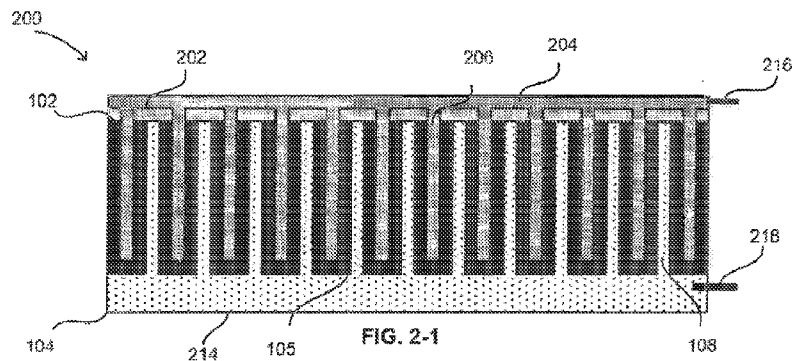
- with international search report (Art. 21(3))
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(54) Title: CAPACITORS COMPRISING PORES IN AN ALUMINIUM SUBSTRATE



(57) Abstract: Capacitors and methods of making the same are disclosed herein. In one embodiment, a capacitor comprises a structure having first (102) and second (104) oppositely facing surfaces and a plurality of pores (206) each extending in a first direction from the first surface towards the second surface, and each having pore having insulating material (105) extending along a wall of the pore; a first conductive portion (204) comprising an electrically conductive material extending within at least some of the pores; and a second conductive portion (108) comprising a region of the structure consisting essentially of aluminum surrounding individual pores of the plurality of pores, the second conductive portion electrically isolated from the first conductive portion by the insulating material extending along the walls of the pores.

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER INV. H01L49/02 H01G4/01 H01G4/10 H01M4/80 ADD.		
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) H01L H01G H01M		
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 practicable, 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 Y A	US 6 825 080 B1 (YANG BIN [SG] ET AL) 30 November 2004 (2004-11-30) column 3, line 10 - column 4, line 28; figures 1-6,10 column 4, line 42 - column 5, line 12; claim 14	1-7,12, 13,24,25 8-11, 26-28 14-23,29
X Y A	----- US 2008/237794 A1 (SHOJI SHIGERU [JP]) 2 October 2008 (2008-10-02) abstract paragraphs [0067] - [0068], [0076] - [0080], [0094], [0106] - [0112]; figures 1,3,7,8,13,25-29	1-7,24 10,11 14-23,29
X A	----- US 2008/158771 A1 (CHINTHAKINDI ANIL K [US] ET AL) 3 July 2008 (2008-07-03) paragraphs [0033], [0034]; claim 3; figures 2A,2C,3A,3C ----- -/--	1 14-23,29
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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	"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	
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		
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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	US 2011/080686 A1 (FARCY ALEXIS [FR] ET AL) 7 April 2011 (2011-04-07)	1-3
Y	paragraphs [0035], [0036], [0085];	8,9,
A	figures 2B,4	26-28
A	----- US 2005/266652 A1 (CHUDZIK MICHAEL P [US] ET AL) 1 December 2005 (2005-12-01) the whole document	1-29
A	----- US 6 387 750 B1 (LAI ERH-KUN [TW] ET AL) 14 May 2002 (2002-05-14) the whole document	1-29
A	----- US 2010/304204 A1 (ROUTKEVITCH DMITRI [US] ET AL) 2 December 2010 (2010-12-02) paragraphs [0106] - [0115]; figures 9-11	1-29
A	----- US 2011/073827 A1 (RUBLOFF GARY W [US] ET AL) 31 March 2011 (2011-03-31) paragraphs [0068] - [0081]; figures 5-7c	1-29
A	----- US 2009/034162 A1 (YAWATA KAZUSHI [JP] ET AL) 5 February 2009 (2009-02-05) paragraphs [0072] - [0097]; figures 1,2,4,6	1-29
A	----- US 2008/197399 A1 (HSU SHENG TENG [US] ET AL) 21 August 2008 (2008-08-21) the whole document	1-29

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/024959

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.:

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: 1-13, 24-28

Capacitor formed in aluminium substrate with pores. Coaxial capacitor, i.e. one electrode surrounding the pores, the other one (partially) filling the pores.

2. claims: 14-23, 29

Capacitor formed in aluminium substrate with pores. Lateral capacitor, i.e. both electrodes in the substrate separated by the dielectric material lining the pores.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2014/024959

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 6825080	B1	30-11-2004	SG 111176 A1 US 6825080 B1	30-05-2005 30-11-2004

US 2008237794	A1	02-10-2008	JP 4877017 B2 JP 2008251972 A US 2008237794 A1	15-02-2012 16-10-2008 02-10-2008

US 2008158771	A1	03-07-2008	NONE	

US 2011080686	A1	07-04-2011	US 2011080686 A1 US 2013286540 A1	07-04-2011 31-10-2013

US 2005266652	A1	01-12-2005	US 2005266652 A1 US 2007111430 A1	01-12-2005 17-05-2007

US 6387750	B1	14-05-2002	NONE	

US 2010304204	A1	02-12-2010	NONE	

US 2011073827	A1	31-03-2011	NONE	

US 2009034162	A1	05-02-2009	US 2009034162 A1 US 2011252615 A1	05-02-2009 20-10-2011

US 2008197399	A1	21-08-2008	NONE	
