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(54) **Title:** MICRO-HOTPLATE DEVICES WITH RING STRUCTURES

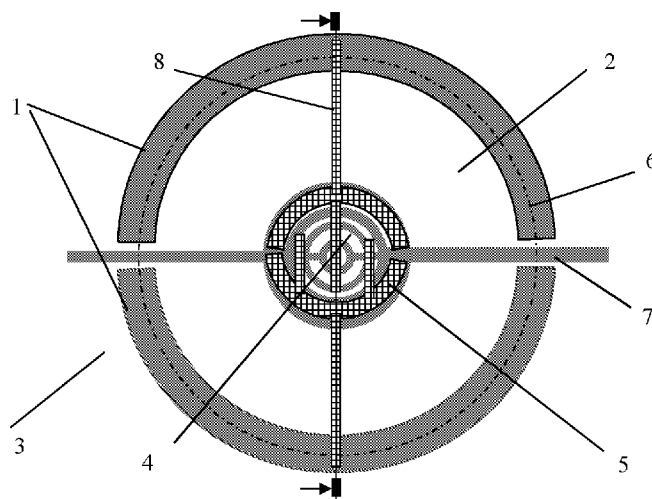


Figure 1

(57) **Abstract:** We disclose a micro-hotplate comprising a substrate comprising an etched portion and a substrate portion and a dielectric region over the substrate. The dielectric region comprises first and second portions. The first portion is adjacent to the etched portion of the substrate and the second portion is adjacent to the substrate portion of the substrate. The micro-hotplate further comprises a heater formed in the dielectric region, and a ring structure formed within and/or over the dielectric region such that the ring structure is coupled with the first and second portions of the dielectric region.



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INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER

INV. G01N27/12

ADD. G01N27/16

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)

G01N

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, INSPEC, COMPENDEX, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 523 788 A (CAMBRIDGE CMOS SENSORS LTD [GB]) 9 September 2015 (2015-09-09) abstract; claims 1, 12, 13, 18, 30-32, 36, 52; figures 1, 5, 10, 11(a), 11(b), 12 page 13, paragraph 3 page 15, paragraph 3-5 page 16, line 3 -----	1,2,8, 18,21, 23-25, 28,33
X	US 2014/105790 A1 (GAUDON ALAIN [FR] ET AL) 17 April 2014 (2014-04-17) abstract; figures 3, 4, 8 paragraphs [0012], [0069] - [0072], [0082] ----- -/-	1,8,18, 20,23, 27,28,33



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 application or patent 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

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

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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	JP 2003 294671 A (FUJI ELECTRIC CO LTD) 15 October 2003 (2003-10-15) abstract; figures 1, 2, 4 -----	1,8,18, 20,23, 28,33
X	US 2010/147070 A1 (JUN CHI HOON [KR] ET AL) 17 June 2010 (2010-06-17) abstract; figures 4A, 4B, 5B paragraphs [0040], [0058] - [0059] -----	1,3-6,8, 18,23, 28,33
X	US 5 464 966 A (GAITAN MICHAEL [US] ET AL) 7 November 1995 (1995-11-07) cited in the application abstract; figures 1B, 3, 5, 6 column 4, lines 58-67 column 6, lines 19-45 column 7, lines 30-49 -----	1,3-6,8, 18,23, 27,28,33
X	US 8 552 380 B1 (FLORIN UDREA [GB] ET AL) 8 October 2013 (2013-10-08) abstract; figures 1, 6, 7, 11, 19, 22-25 column 5, lines 8-9 column 6, lines 38-39 column 8, lines 27-34 column 9, lines 5-24 column 10, lines 31-38, 50-64 -----	1,3-6,8, 18, 23-25, 27-29,33 17,19, 20,26,29 7
Y	US 4 580 439 A (MANAKA JUNJI [JP]) 8 April 1986 (1986-04-08) abstract; figures 26, 27 column 11, lines 36-41 -----	17,19, 20,26,29
A	DE 103 15 190 A1 (BOSCH GMBH ROBERT [DE]) 21 October 2004 (2004-10-21) abstract; figures 2, 3 paragraphs [0010] - [0012], [0015], [0017] -----	19,20,29

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2017/051468

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.:
1-7, 17-21, 23-29, 33(completely); 8(partially)
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, 2, 18, 21, 23, 27, 28, 33(completely); 8(partially)

A device comprising a substrate including an etched portion, a dielectric region over the substrate, and a ring structure over the dielectric region, and a manufacturing method of the device.

2. claims: 3-7, 17, 19, 20, 24-26, 29

A micro-hotplate device characterised in that the ring structure is located along a perimeter of the portion of the dielectric region adjacent to the etched portion of the substrate.

3. claims: 9-16(completely); 8(partially)

A micro-hotplate device characterised by a ring structure comprising multiple ring layers stacked over one another, allowing for a manufacture according to standard CMOS process steps.

4. claim: 22

A micro-hotplate device characterised in that the etched portion of the substrate is formed using a front etching technique.

5. claims: 30-32

A semiconductor device characterised by an at least a partially ring-shaped temperature sensing device placed between the centre of the etched portion and the edge of the ring structure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2523788	A	09-09-2015	CN 106164661 A	23-11-2016
			EP 3114467 A1	11-01-2017
			GB 2523788 A	09-09-2015
			JP 2017520878 A	27-07-2017
			KR 20160130814 A	14-11-2016
			TW 201539668 A	16-10-2015
			US 2017074815 A1	16-03-2017
			WO 2015132563 A1	11-09-2015

US 2014105790	A1	17-04-2014	CN 103718031 A	09-04-2014
			CN 105784787 A	20-07-2016
			EP 2533037 A1	12-12-2012
			EP 2718705 A1	16-04-2014
			JP 2014519042 A	07-08-2014
			KR 20140074269 A	17-06-2014
			US 2014105790 A1	17-04-2014
			WO 2012168444 A1	13-12-2012

JP 2003294671	A	15-10-2003	NONE	

US 2010147070	A1	17-06-2010	KR 20100070220 A	25-06-2010
			US 2010147070 A1	17-06-2010

US 5464966	A	07-11-1995	AU 5451494 A	24-05-1994
			US 5464966 A	07-11-1995
			WO 9410822 A1	11-05-1994

US 8552380	B1	08-10-2013	CN 104412082 A	11-03-2015
			EP 2847561 A1	18-03-2015
			KR 20150009987 A	27-01-2015
			US 8552380 B1	08-10-2013
			WO 2013167875 A1	14-11-2013

US 4580439	A	08-04-1986	CA 1216330 A	06-01-1987
			US 4580439 A	08-04-1986
			US 4740387 A	26-04-1988

DE 10315190	A1	21-10-2004	NONE	
