

(12)

EUROPEAN PATENT APPLICATION

(88)

Date of publication A3:
09.04.2003 Bulletin 2003/15

(51)

Int Cl.7: H01J 9/02

(43)

Date of publication A2:
31.01.2001 Bulletin 2001/05

(21)

Application number: 00402144.0

(22)

Date of filing: 27.07.2000

(84) Designated Contracting States: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE Designated Extension States: AL LT LV MK RO SI	(72) Inventor: Mika, Ishiwata Shinagawa-ku, Tokyo (JP)
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(54)

Method of manufacturing cold cathode field emission device and method of manufacturing cold cathode field emission display

(57)

A method of manufacturing a cold cathode field emission device, which comprises the steps of;

- (A) forming a cathode electrode (11) on a support (10),

(B) forming an insulating layer (12) on the cathode electrode (11) and the support (10),

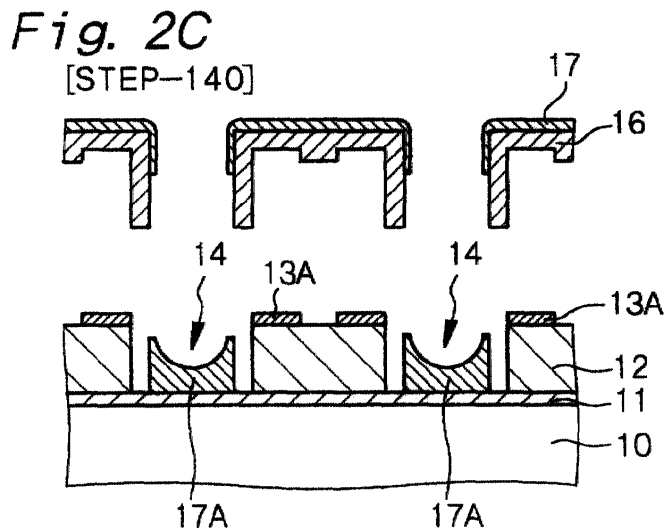
(C) forming a gate electrode (13A) on the insulating layer (12),

(D) forming an opening portion (14) having a bottom portion where the cathode electrode (11) is ex-

posed, at least in the insulating layer (12),

(E) forming an electron emitting electrode composed of an electric conductive composite (17) containing electric conductive particles and a binder on the cathode electrode (11) exposed in the bottom portion of the opening portion (14), and

(F) removing the binder in a surface layer portion of the electron emitting electrode to expose the electric conductive particles on the surface of the electron emitting electrode (17A).





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 40 2144

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GEIS M W ET AL: "DIAMOND GRIT-BASED FIELD EMISSION CATHODES", IEEE ELECTRON DEVICE LETTERS, IEEE INC. NEW YORK, US, VOL. 18, NR. 12, PAGE(S) 595-598 XP000727110 ISSN: 0741-3106 * page 595; figure 1A *	1	H01J9/02
E	EP 1 073 090 A (ILJIN NANOTECH CO LTD) 31 January 2001 (2001-01-31) * claims 1,5 *	1,10	
A	US 5 695 378 A (YUI ROBERT E ET AL) 9 December 1997 (1997-12-09) * claims 1-12 *	1,9	
A	EP 0 905 737 A (ISE ELECTRONICS CORP) 31 March 1999 (1999-03-31) * claims 11-18 *	1	
A	WO 97 47020 A (CANDESCENT TECH CORP) 11 December 1997 (1997-12-11) * claim 1 *	1	
A	EP 0 712 146 A (COMMISSARIAT ENERGIE ATOMIQUE) 15 May 1996 (1996-05-15) * claims 5-10 *	1	
A	EP 0 724 280 A (NIPPON ELECTRIC CO) 31 July 1996 (1996-07-31) * claim 1 *	1	
A	EP 0 834 897 A (SGS THOMSON MICROELECTRONICS) 8 April 1998 (1998-04-08) * claim 1 *	1	
		-/--	
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		18 February 2003	Van den Bulcke, E
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)



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EUROPEAN SEARCH REPORT

Application Number
EP 00 40 2144

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	EP 0 779 642 A (SGS THOMSON MICROELECTRONICS) 18 June 1997 (1997-06-18) * claims 1-7 *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 February 2003	Examiner Van den Bulcke, E
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 40 2144

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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18-02-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1073090	A	31-01-2001	CN 1286500 A	07-03-2001
			EP 1073090 A2	31-01-2001
			JP 2001076651 A	23-03-2001
US 5695378	A	09-12-1997	US 5686782 A	11-11-1997
EP 0905737	A	31-03-1999	JP 11111158 A	23-04-1999
			JP 2000036243 A	02-02-2000
			EP 0905737 A1	31-03-1999
			JP 11167886 A	22-06-1999
			US 6239547 B1	29-05-2001
WO 9747020	A	11-12-1997	US 5865657 A	02-02-1999
			EP 1018131 A1	12-07-2000
			JP 2001506395 T	15-05-2001
			KR 2000016557 A	25-03-2000
			TW 398005 B	11-07-2000
			WO 9747020 A1	11-12-1997
EP 0712146	A	15-05-1996	FR 2726688 A1	10-05-1996
			DE 69510521 D1	05-08-1999
			DE 69510521 T2	16-03-2000
			EP 0712146 A1	15-05-1996
			JP 8241664 A	17-09-1996
			US 5828162 A	27-10-1998
EP 0724280	A	31-07-1996	DE 69622445 D1	29-08-2002
			EP 0724280 A1	31-07-1996
			JP 2956565 B2	04-10-1999
			JP 8273534 A	18-10-1996
			US 5787337 A	28-07-1998
EP 0834897	A	08-04-1998	EP 0834897 A1	08-04-1998
			DE 69621017 D1	06-06-2002
			DE 69621017 T2	31-10-2002
			JP 10188785 A	21-07-1998
			US 6465950 B1	15-10-2002
			US 6036566 A	14-03-2000
EP 0779642	A	18-06-1997	EP 0779642 A1	18-06-1997
			DE 69518849 D1	19-10-2000
			DE 69518849 T2	11-01-2001
			US 6000980 A	14-12-1999

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82