(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 329 928 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
08.02.2006 Bulletin 2006/06

(43) Date of publication A2:
23.07.2003 Bulletin 2003/30

(21) Application number: **02258747.1**

(22) Date of filing: **18.12.2002**

(51) Int Cl.:
H01J 1/304 *(2006.01)* ***H01J 1/316*** *(2006.01)*
G09G 3/22 *(2006.01)*

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LU MC NL PT SE SI SK TR
Designated Extension States:
AL LT LV MK RO

(30) Priority: **20.12.2001 US 27232**
26.07.2002 US 206409
26.02.2002 JP 2002049754
24.06.2002 JP 2002183481
01.11.2002 JP 2002319761

(71) Applicant: **NGK INSULATORS, LTD.**
Nagoya-City, Aichi Pref. 467-8530 (JP)

(72) Inventors:
- **Takeuchi, Yukihisa**
  Mizuho-ku,Nagoya-shi,
  Aichi-ken 467-8530 (JP)
- **Nanataki, Tsutomu**
  Mizuho-ku,Nagoya-shi,
  Aichi-ken 467-8530 (JP)
- **Ohwada, Iwao**
  Mizuho-ku,Nagoya-shi,
  Aichi-ken 467-8530 (JP)
- **Horiuchi, Tomoya**
  Mizuho-ku,Nagoya-shi,
  Aichi-ken 467-8530 (JP)

(74) Representative: **Paget, Hugh Charles Edward et al**
Mewburn Ellis LLP
York House
23 Kingsway
London WC2B 6HP (GB)

(54) Electron-emitting element and field emission display using the same

(57) An electron-emitting element includes an electric field applying portion (1) composed of a dielectric, a first electrode (2) formed on one surface of the electric field applying portion, and a second electrode (3) being formed on the surface and forming a slit in cooperation with the first electrode, and is formed on a substrate (4).

EP 1 329 928 A3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 25 8747

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
P,X	EP 1 265 263 A (NGK INSULATORS, LTD) 11 December 2002 (2002-12-11) * paragraphs [0055] - [0057], [0071] - [0079], [0091] - [0103], [0116], [0118]; claims 1-35; figures 1-16 *	1-7,9-18	H01J1/304 H01J1/316 G09G3/22
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 06, 30 June 1997 (1997-06-30) -& JP 09 045226 A (CANON INC), 14 February 1997 (1997-02-14) * abstract; figures 1,4,7,9 *	1-5,7, 9-14,17, 18	
Y	- " -	16	
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 05, 30 May 1997 (1997-05-30) -& JP 09 027273 A (CANON INC), 28 January 1997 (1997-01-28) * abstract; figures 1-4,6,9,11 *	1-14,17, 18	
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 02, 28 February 1997 (1997-02-28) -& JP 08 264105 A (KANEBO LTD; OKUYAMA MASANORI), 11 October 1996 (1996-10-11) * abstract; figure 1 * * paragraphs [0008], [0009], [0018] *	1-6, 9-14,17, 18	TECHNICAL FIELDS SEARCHED (IPC) H01J G09G
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 08, 29 August 1997 (1997-08-29) -& JP 09 090882 A (KOMATSU LTD), 4 April 1997 (1997-04-04) * abstract; figures 1,12 * * paragraphs [0008], [0009], [0018] *	1-5,9, 11,14, 17,18	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 December 2005	Weisser, W

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)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 25 8747

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JUN-ICHI ASANO ET AL: "ELECTRON EMISSION INTO VACUUM FROM PZT FERROELECTRIC CERAMICS INDUCED BY POLARIZATION REVERSAL" EXTENDED ABSTRACTS OF THE INTERNATIONAL CONFERENCE ON SOLID STATE DEVICES AND MATERIALS, JAPAN SOCIETY OF APPLIED PHYSICS. TOKYO, JA, 1 August 1992 (1992-08-01), pages 466-468, XP000312255 * page 466, left-hand column; figures 1,3 * * page 467, left-hand column *	1-5,9, 11-14, 17,18	
X	FR 2 789 221 A (UNIVERSITE DE NANTES) 4 August 2000 (2000-08-04) * abstract; figures 2,3 * * page 5, lines 24-38 * * page 8, columns 5-27 *	1-5,9, 11-14, 17,18	
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 02, 29 February 2000 (2000-02-29) -& JP 11 317149 A (CANON INC), 16 November 1999 (1999-11-16) * abstract; figures 1-10,13,15-19 *	1,3, 5-12,14, 17,18	TECHNICAL FIELDS SEARCHED (IPC)
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 06, 30 April 1998 (1998-04-30) -& JP 10 040806 A (CANON INC), 13 February 1998 (1998-02-13) * abstract; figures 1,2,9,10,18,17 *	1,3, 5-12,14, 15,17,18	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 December 2005	Weisser, W

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)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 25 8747

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 767 481 A (CANON KABUSHIKI KAISHA) 9 April 1997 (1997-04-09) * columns 11,12,16; figures 1,3,4,13-18,25 * -----	1,3, 5-10,12, 14,17, 1811	
X	US 5 831 387 A (KANEKO ET AL) 3 November 1998 (1998-11-03) * columns 7-9,11; figures 3,4,9,11 * -----	1,3, 5-10,12, 17,18	
D,X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 13, 5 February 2001 (2001-02-05) -& JP 2000 285801 A (CANON INC), 13 October 2000 (2000-10-13) * abstract; figures 1,6,8,9,12 * -----	1,3,5-7, 9,12,14, 17,18	
D,X	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 09, 31 October 1995 (1995-10-31) -& JP 07 147131 A (TDK CORP), 6 June 1995 (1995-06-06) * abstract; figures 1,5,11 * -----	1,3,5-9, 12,14, 17,18	TECHNICAL FIELDS SEARCHED (IPC)
D,X	PATENT ABSTRACTS OF JAPAN vol. 014, no. 112 (E-0897), 28 February 1990 (1990-02-28) -& JP 01 311533 A (CANON INC), 15 December 1989 (1989-12-15) * abstract; figures 7,8,10,11,14-17,20-23 * -----	1,3,5,9, 12,14, 15,17,18	
Y	EP 1 073 090 A (ILJIN NANOTECH CO., LTD) 31 January 2001 (2001-01-31) * paragraphs [0002], [0004]; figure 1 * -----	16	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 December 2005	Weisser, W

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 02 25 8747

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-12-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1265263 A	11-12-2002	WO 02052600 A1	04-07-2002
		JP 3699451 B2	28-09-2005
		US 2002153827 A1	24-10-2002
JP 09045226 A	14-02-1997	NONE	
JP 09027273 A	28-01-1997	NONE	
JP 08264105 A	11-10-1996	NONE	
JP 09090882 A	04-04-1997	WO 9711476 A1	27-03-1997
FR 2789221 A	04-08-2000	NONE	
JP 11317149 A	16-11-1999	NONE	
JP 10040806 A	13-02-1998	JP 3320333 B2	03-09-2002
EP 0767481 A	09-04-1997	CN 1150366 A	21-05-1997
		DE 69625869 D1	27-02-2003
		DE 69625869 T2	28-08-2003
		JP 3376220 B2	10-02-2003
		JP 9161668 A	20-06-1997
		US 6184851 B1	06-02-2001
US 5831387 A	03-11-1998	NONE	
JP 2000285801 A	13-10-2000	NONE	
JP 07147131 A	06-06-1995	NONE	
JP 01311533 A	15-12-1989	JP 2654571 B2	17-09-1997
EP 1073090 A	31-01-2001	CN 1286500 A	07-03-2001
		JP 2001076651 A	23-03-2001

EPO FORM P0459

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