

2018 31st International Vacuum Nanoelectronics Conference (IVNC 2018)

**Kyoto, Japan
9-13 July 2018**



**IEEE Catalog Number: CFP18VAC-POD
ISBN: 978-1-5386-5718-8**

**Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP18VAC-POD
ISBN (Print-On-Demand):	978-1-5386-5718-8
ISBN (Online):	978-1-5386-5717-1
ISSN:	2164-2370

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

List of Contents

Local Organizing Committee	iv
Local Program Committee.....	iv
International Steering Committee	v
IVNC 2018 Sponsors and Supporting Societies	vi
IVMC/IVNC Conference History and Chair Persons	vii
Schedule	viii
Program and Index	
Registration/Poster Preview Session/Reception	ix
Oral Session	x
Poster Session 1.....	xxi
Poster Session 2.....	xxviii
Extended Abstracts	
Oral Sessions	
Oral Presentations on Tuesday 10 th July.....	1
Oral Presentations on Wednesday 11 th July.....	31
Oral Presentations on Thursday 12 th July	61
Oral Presentations on Friday 13 th July	77
Poster Sessions	
Poster Presentations on Tuesday 10 th July	105
Poster Presentations on Wednesday 11 th July	237
Author Index.....	368

Tuesday, 10th July 2018

(Science Hall)

9:00 – 9:10

Opening Remarks

Prof. Yasuhito Gotoh, Conference Chair

Plenary Session 1 (Science Hall)

Chair: Akintunde I. Akinwande

9:10 - 9:55 Plenary 1 PL-1	Semiconductor inspection and metrology challenges <u>John Fielden</u> <i>KLA Tencor, USA</i>	p. 2
9:55 – 10:25 Invited 1 I-1	Coherent pulse beam in spin-polarized TEM using an NEA photocathode <u>Makoto Kuwahara</u> , Toru Ujihara, Koh Saitoh, Nobuo Tanaka <i>Nagoya University, Japan</i>	p. 4

10:25 – 10:40 Coffee Break

Oral Session 1 (Science Hall)

Beam Applications

Chair: Kyu Chang Park

10:40 – 11:10 Invited 2 I-2	Development of a Multi-beam mask writer MBM-1000 <u>Munehiro Ogasawara</u> , Hiroshi Matsumoto <i>NuFlare Technology, Inc., Japan</i>	p. 6
11:10 – 11:30 O1-1	New applications for ultra-high brightness LaB₆ nanowire cathode <u>Han Zhang</u> , Jie Tang, Lu-Chang Qin, Yu Jimbo, Akira, Niwata, Shinichi Kitamura, Hironobu Manabe <i>National Institute for Materials Science, Japan</i>	p. 8
11:30 – 11:50 O1-2	Silicon Cold Field Emission Electron Sources for Electron Microscopy Inspection Systems <u>Frances A. Hill</u> , Gary V. Lopez, Rudy F. Garcia, Katerina Ioakeimidi, Mike Romero, Zefram D. Marks, Gildardo R. Delgado <i>KLA-Tencor, USA</i>	p. 10

11:50 – 12:10 O1-3 (P1-70)	Structural evolution of polycrystalline tungsten tips with palladium oxide reservoirs <u>Hiroataka Asai</u> , Ryota Kawai, Fumiya Matsubara, Hidekazu Murata, Eiji Rokuta <i>Meijo University, Japan</i>	p. 12
12:10 – 12:30 O1-4 (P1-71)	FEM and FIM of Graphene: Possible Observation of Electronic States at Edges <u>Yahachi Saito</u> , Yuhdai Watanabe, Tohru Hoshino, Hitoshi Nakahara, Kazuya Kunoh, Shigekazu Nagai, Koichi Hata <i>Toyota Physical and Chemical Research Institute</i>	p. 14

12:30 – 14:00 Lunch (Atrium)

Oral Session 2 (Science Hall)

Theory, Physics & Modeling I

Chair: Richard G. Forbes

14:00 – 14:30 Invited 3 I-3	Plasmon excitation and electron emission by linearly polarized laser: a time-dependent first-principles simulation <u>Kazuyuki Watanabe</u> , Kazuki Uchida <i>Tokyo University of Science, Japan</i>	N/A
14:30 – 15:00 Invited 4 I-4	Optical control of coherent electron waves from a nano-tip <u>Hirofumi Yanagisawa</u> <i>Ludwig-Maximilians University, Germany</i>	N/A
15:00 – 15:20 O2-1	Spin resolved Imaging with Scanning Field-Emission Microscopy <u>Urs Ramsperger</u> , Lorenzo G. De Pietro, Gabrielle Bertolini, Hugo Cabrera, Jingyuan Zhou, Oguzhan Gurlu, Alessandro Vindigni, Danilo Pescia, <i>ETH Zurich, Switzerland</i>	p. 20
15:20 – 15:40 O2-2	Improvement of a number of active tips and emission measurements from individual tips in volcano-structured Spindt-type field emitter arrays <u>Hidekazu Murata</u> , Hidetoshi Shinya, Takahiro Ikeda, Koudai Taguchi, Eiji Rokuta, Hiroshi Shimoyama, Masayoshi Nagao, Katsuhisa Murakami <i>Meijo University, Japan</i>	p. 22

15:40 – 16:00 Coffee Break

Oral Session 3 (Science Hall)

Theory, Physics & Modeling II

Chair: Jonathan Shaw

16:00 – 16:20 O3-1	Influence of the intrinsic transverse energy on the coherent propagation of the wave function of field emission electrons <u>Soichiro Tsujino</u> <i>Paul Scherrer Institute, Switzerland</i>	N/A
16:20 – 16:40 O3-2	Fluctuations of the emission characteristics of multi-tip field cathodes <u>Anatoly G. Kolosko</u> , Eugeni O. Popov, Sergey V. Filippov <i>Ioffe Institute, Russia</i>	p. 26
16:40 – 17:00 O3-3	Discrepancies and universality in the fractional reduction of the apex-field enhancement factor considering small clusters of field emitters <u>Thiago A. de Assis</u> , Fernando Funinato Dall'Agnol <i>Federal University of Bahia, Brazil</i>	p. 28

9:00 – 19:00	Poster Preview Session (Foyer) One-page highlight of each poster paper will be sequentially displayed on a 50" LCD screen.	
17:00 – 19:00	Poster Session 1 (Foyer, Room A, and Room G)	

Wednesday, 11th July 2018

Plenary Session 2 (Science Hall)

Chair: Christopher Holland

9:00 - 9:45 Plenary 2 PL-2	Minimal Fab - Using half-inch wafers to reduce a fab investment to 1/1,000- <u>Shiro Hara</u> <i>National Institute of Advanced Industrial Science and Technology, Japan</i>	N/A
9:45 – 10:15 Invited 5 I-5	Microfabricated electrospray propulsion for small satellites <u>Paulo Lozano</u> <i>Massachusetts Institute of Technology, USA</i>	p. 34

10:15 – 10:30 Coffee Break

Oral Session 4 (Science Hall)

Fabrication & Novel Emitters

Chair: Jan A. Dziuban

10:30 – 11:00 Invited 6 I-6	Graphene-oxide-semiconductor planar-type electron emission device and its applications <u>Katsuhisa Murakami</u> , Joji Miyaji, Ryo Furuya, Manabu Adachi, Masayoshi Nagao, Yoshihiro Nemoto, Masaki Takeguchi, Yoichiro Neo, Yoshinori Takao, Yoichi Yamada, Masahiro Sasaki, Hidenori Mimura <i>National Institute of Advanced Industrial Science and Technology, Japan</i>	p. 36
11:00 – 11:20 O4-1	Reduced energy-angle dispersion of output electrons from a nanocrystalline Si emitter with a monolayer-graphene surface electrode <u>Akira Kojima</u> , Ryutaro Suda, Nobuyoshi Koshida <i>Tokyo University of Agriculture and Technology, Japan</i>	p. 38
11:20 – 11:40 O4-2	Operation of a Carbon Nanotube Field-Emission Cathode in Low Earth Orbit <u>Yasushi Ohkawa</u> , Teppei Okumura, Kentaro Iki, Hiroyuki Okamoto, Satomi Kawamoto <i>Japan Aerospace Exploration Agency, Japan</i>	p. 40

11:40 – 12:00 O4-3	CNT cold electron emitters for space applications <u>Philipp Laufer</u> , Daniel Bock, Martin Tajmar <i>Technische Universität Dresden, Germany</i>	N/A
12:00 – 12:20 O4-4 (P2-70)	Fabrication of Electrospray Thrusters with a High-Density Emitter Array Utilizing Minimal-Fab System <u>Naoki Inoue</u> , Masayoshi Nagao, Katsuhisa Murakami, Sommawan Khumpuang, Shiro Hara, Yoshinori Takao <i>Yokohama National University, Japan</i>	p. 44

12:20 – 14:00 Lunch (Atrium)

ISC Meeting (Science Center Club)

Oral Session 5 (Science Hall)

Materials I

Chair: Hans Koops

14:00 – 14:30 Invited 7 I-7	Field Emission from Oxide Nanowires: Mechanism and Applications <u>Jun Chen</u> , Yicong Chen, Zhufan Lin, Long Zhao, Daokun Chen, Kun Wang, Zhipeng Zhang, Guofu Zhang, Juncong She, Shaozhi Deng, Ningsheng Xu <i>Sun Yat-sen University, China</i>	p. 46
14:30 – 14:50 O5-1	Controlled Preparation of Micron-Size-Patterned ZnO Nanowire Field Emitters <u>Libin Wang</u> , Long Zhao, Keshuang Zheng, Juncong She, Shaozhi Deng, Ningsheng Xu, Jun Chen <i>Sun Yat-sen University, China</i>	p. 48
14:50 – 15:10 O5-2	Electron sources based on diamond pin-diodes <u>Franz A. M. Koeck</u> , Manpuneet Benipal, Robert J. Nemanich <i>Arizona State University, USA</i>	p. 50

15:10 – 15:30 Coffee Break

Oral Session 6 (Science Hall)

Materials II

Chair: Cheol Jin Lee

15:30 – 16:00 Invited 8 I-8	2D Materials by Pulsed Laser Deposition with applications in Nano Electronics and Clean Energy <u>Daniel Chua</u> <i>National University of Singapore, Singapore</i>	N/A
16:00 – 16:20 O6-1	Electron Emission from the Flatland: Universal Formulation of Field and Thermionic Emission for 2D Materials <u>Yee Sin Ang</u> , L. K. Ang <i>Singapore University of Technology and Design, Singapore</i>	p. 54
16:20 – 16:40 O6-2	On-Chip Thermionic Electron Emitter Based on Single-Walled Carbon Nanotube <u>Yuwei Wang</u> , Xianlong Wei <i>Peking University, China</i>	p. 56
16:40 – 17:00 O6-3	Improved Multiscale Model of Heat Exchange at the Apex of Carbon Nanotube Fiber Cathodes <u>Jonathan Ludwick</u> , Weiming Zhu, Marc Cahay <i>University of Cincinnati, USA</i>	p. 58

9:00 – 19:00	Poster Preview Session (Foyer) One-page highlight of each poster paper will be sequentially displayed on a 50" LCD screen.	
17:00 – 19:00	Poster Session 2 (Foyer, Room A and Room G)	

Thursday, 12th July 2018

Plenary Session 3 (Science Hall)

Chair: Hidenori Mimura

9:00 - 9:45 Plenary 3 PL-3	Phase-Controlled Magnetron Technology for Wireless Power Transfer <u>Naoki Shinohara</u> <i>Kyoto University, Japan</i>	p. 62
9:45 – 10:15 Invited 9 I-9	Cold Cathode Based Microwave Devices for Current and Future Systems <u>David R. Whaley</u> , Carter M. Armstrong, Christopher E. Holland, Charles A. Spindt, Paul R. Schwoebel <i>L3 Technologies, Inc., USA</i>	p. 64

10:15 – 10:30 Coffee Break

Oral Session 7 (Science Hall)

Applications I

Chair: Rupert Schreiner

10:30 – 11:00 Invited 10 I-10	Development of mercury-free ultraviolet light emitting devices <u>Takashi Kita</u> <i>Kobe University, Japan</i>	p. 66
11:00 – 11:20 O7-1	Cathodoluminescent Lamp for General Lighting Using Carbon Fiber Field Emission Cathode Evgenii P. Sheshin, Nikolai N. Chadaev, Artem Yu. Kolodyazhnyj, Alexandr O. Getman, <u>Chan Kyaw Nyein</u> , Naing Win Lwin, Dmitry I. Ozol <i>Moscow Institute of Physics and Technology, Russia</i>	N/A
11:20 – 11:40 O7-2	Fabrication of large area planar UV lighting devices utilizing flat Cs₃Sb photocathode emitters <u>Hyo-Soo Jeong</u> , Kris Keller, Brad Culkin <i>The University of Suwon, Korea</i>	N/A
11:40 – 12:00 O7-3	The role of lateral confinement in the localized heating of thermionic emitters based on carbon nanotube forests <u>Mokter Chowdhury</u> , Harrison Fan, Mike Chang, Kais Dridi, Kevin Voon, George Sawakzky, Alireza Nojeh <i>University of British Columbia, Canada</i>	p. 72

12:00 – 12:20	MEMS ion source for ion mobility spectrometry <u>Tomasz Grzebyk</u> , Piotr Szyszka, Michal Krysztof, Anna Gorecka-Drzazga, Jan Dziuban <i>Wroclaw University of Science and Technology, Poland</i>	p. 74
O7-4		

12:30 – Lunch and Excursion
Kurama and Sanzen-in Temples

19:00 – Banquet
Kyoto Tokyu Hotel

Friday, 13th July 2018

Oral Session 8 (Science Hall)

Applications II

Chair: Jun Chen

9:00 - 9:30 Invited 11 I-11	High performance carbon nanotube cold cathode for x-ray and UV devices <u>Kyu Chang Park</u> , Sung Tae Yoo, Jung Su Kang <i>Kyung Hee University, Korea</i>	p. 78
9:30 – 9:50 O8-1	Simulation of Electron Emission from Laser-Irradiated Pyroelectric Crystal Tenta Komatsu, Satoshi Abo, <u>Fujio Wakaya</u> , Mikio Takai, Tomoaki Masuzawa, Hidenori Mimura <i>Osaka University, Japan</i>	p. 80
9:50 – 10:10 O8-2	Controlling thermal failure of silicon field emitters in a commercial X-ray source <u>Aquila Mavalankar</u> , Jamie Cameron, Isabel Gomes, Silvia Sottini, Manuel Fohler, Vadim Soloviev, Gil Travish, Ken Mingard, Caterina Minelli <i>Adaptix Ltd, United Kingdom</i>	p. 82
10:10 – 10:30 O8-3	Two applications of carbon nanotube paste emitters: nano-focus, and high-flux vacuum-sealed x-ray tubes <u>Jin-Woo Jeong</u> , Jun-Tae Kang, Sora Park, Jae-Woo Kim, Ki Nam Yun, Eunsol Go, Jeong-Woong Lee, Hyojin Jeon, Yujung Ahn, Ji-Hwan Yeon, Sunghee Kim, Yoon-Ho Song <i>ETRI & UST, Korea</i>	p. 84
10:30 – 10:50 O8-4	High performance x-ray source using point-typed CNT field emitter Sang Heon Lee, Jun Soo Han, Han Bin Go, Joohyun Jeon, Jun Hyeok Yang, Paul Kim, <u>Cheol Jin Lee</u> <i>Korea University, Korea</i>	p. 86

10:50 – 11:10 Coffee Break

Oral Session 9 (Science Hall)

Applications III

Chair: Alireza Nojeh

11:10 – 11:30 O9-1	Nanoscale Vacuum Field Emission Devices for Harsh Environments <u>Lucia B. De Rose</u> , William M. Jones, Axel Scherer <i>California Institute of Technology, USA</i>	N/A
11:30 – 11:50 O9-2	Vacuum emission in large-area nanogap fabricated by MEMS-controlled cleavage of single crystal silicon <u>Amit Banerjee</u> , Yoshikazu Hirai, Toshiyuki Tsuchiya, Osamu Tabata <i>Kyoto University, Japan</i>	p. 90
11:50 – 12:10 O9-3	Optically Gated, Nanoscale Field Emission Transistor <u>William M. Jones</u> , Lucia DeRose, Axel Scherer <i>Jet Propulsion Laboratory, USA</i>	N/A

12:10 – 13:40 Lunch (Atrium)

Oral Session 10 (Science Hall)

Applications IV & FEAs

Chair: Soichiro Tsujino

13:40 – 14:10 Invited 12 I-12	Recent progress in development of radiation tolerant image sensor with field emitter array <u>Tomoaki Masuzawa</u> , Yoichiro Neo, Hidenori Mimura Yasuhito Gotoh, Masayoshi Nagao, Tamotsu Okamoto, Tomoya Igari, Masafumi Akiyoshi, Nobuhiro Sato, Ikuji Takagi <i>Shizuoka University, Japan</i>	p. 94
14:10 – 14:30 O10-1	Operation of field emitter arrays under high dose rate gamma-ray irradiation <u>Teruyuki Morito</u> , Yusuke Handa, Yasuhito Gotoh, Masayoshi Nagao, Nobuhiro Sato, Masafumi Akiyoshi, Ikuji Takagi, Tamotsu Okamoto <i>Kyoto University, Japan</i>	p. 96
O10-2	Withdrawn	

14:30 – 14:50 O10-3	Arrays of Si Field Emitter Individually Regulated by Si Nanowires - High Breakdown Voltages and Enhanced Performance <u>Girish Rughoobur</u> , Akintunde I. Akinwande <i>Massachusetts Institute of Technology, USA</i>	p. 98
14:50 – 15:10 O10-4	Commutable cold cathodes based on vertically aligned carbon nanotubes with a buried modulation electrode <u>Pierre-Louis Gautherin</u> , Lucie Sabaut, Pascal Ponard, Laurent Gangloff, Jean-Paul Mazellier <i>Thales Electron Devices, France</i>	p. 100
15:10 – 15:30 O10-5	Study of multi-function electron gun based on CNTs cathode <u>Jian Zhang</u> , Qilong Wang, Zhiyang Qi, Ji Xu, Xiaobing Zhang <i>Southeast University, China</i>	p. 102

15:30 – **Closing Remarks**
 Prof. Yasuhito Gotoh, Conference Chair

Poster Preview Session

Slide show on a 50" LCD display in Foyer (not mandatory)

Provide the staff at the registration desk with one page slide that highlights the contents of the poster paper.

Provided slides will be added to the slide show.

9th July 15:00 – 20:00

10th July 9:00 – 19:00

11th July 9:00 – 19:00

Poster Session 1

17:00 – 19:00 Tuesday, 10th July, 2018

Foyer, Room A and Room G

P1-1	Fractional model of field emission from rough surface with nonparabolic energy dispersion Muhammad Zubair, <u>Yee Sin Ang</u> , Lay Kee Ang <i>Singapore University of Technology and Design (SUTD)</i>	N/A
P1-2	Potential Resolution to the Current Saturation Problem Stanislav S. Baturin, Alexander V. Zinovev, <u>Sergey V. Baryshev</u> <i>Michigan State University, USA</i>	N/A
P1-3	Field emission current investigation of p-type and metallized silicon emitters in the frequency domain <u>Christoph Langer</u> , Matthias Hausladen, Christian Prommesberger, Robert Lawrowski, Michael Bachmann, Felix Düsberg, Andreas Pahlke, Mikhail Shamonin, Rupert Schreiner <i>OTH Regensburg, Germany</i>	p. 110
P1-4	Field Emitted Current from a Paraboloidal Nano-Emitter Using its Exact Eigenstates and a Three-Dimensional WKB Expression for the Transmission Coefficient <u>Andreas Chatziafratis</u> , John P Xanthakis <i>National Technical University of Athens, Greece</i>	p. 112
P1-5	Theory of thermionic electron emission from graphene beyond Dirac approximation: A full-band tight-binding approach Yueyi Chen, <u>Yee Sin Ang</u> , L. K. Ang <i>Singapore University of Technology and Design, Singapore</i>	p. 114
P1-6	An impact of thermal electron energy on the field-electron emission from nanosized silicon tips N. A. Djuzhev, <u>Gleb D. Demin</u> , Petr Y. Glagolev, Maksim A. Makhaboroda, Nikolay N. Patyukov <i>National Research University of Electronic Technology (MIET), Russia</i>	p. 116
P1-7	Influence of adsorbates on the performance of a field emitter array in a high voltage triode setup <u>Simon Edler</u> , Walter Hansch, Michael Bachmann, Felix Düsberg, Martin Hofmann, J. Jakšič, J. Breuer, Florian Dams, Andreas Pahlke, Christoph Langer, Robert Lawrowski, Christian Prommesberger, Rupert Schreiner <i>Bundeswehr Universität, Germany</i>	p. 118

P1-8	Physical explanation of the universal (separation)⁻³ law found numerically for the electrostatic interaction between two protruding nanostructures <u>Richard G. Forbes</u> <i>University of Surrey, United Kingdom</i>	p. 120
P1-9	Fowler-Nordheim-plot shape associated with large series resistance Samer I. Daradkeh, Marwan S. Mousa, <u>Richard G. Forbes</u> <i>University of Surrey, United Kingdom</i>	p. 122
P1-10	A proposal that constants used widely in electron and ion emission theory should be included in international listings of universal constants <u>Richard G. Forbes</u> <i>University of Surrey, United Kingdom</i>	p. 124
P1-11	Comparison of the Lepetit field emission current-density calculations with the Modinos-Forbes uncertainty limits <u>Richard G. Forbes</u> <i>University of Surrey, United Kingdom</i>	p. 126
P1-12	Universal inverse-third-power dependence (on separation) of the electrostatic interaction between two protruding nanostructures <u>Richard G. Forbes</u> , Thiago A. De Assis, Fernando F Dall'Agnol <i>University of Surrey, United Kingdom</i>	p. 128
P1-13	Fundamental features of field emission from carbon nanoclusters (graphenes, nanotubes, HOPG) <u>Georgiy Fursey</u> , Mikhail Polyakov, Nikolay Bagraev <i>Saint-Petersburg State University of Telecommunications, Russia</i>	N/A
P1-14	The energy spectrum of field emission electrons from HOPG, mWCNT and graphene-like structures <u>Georgiy Fursey</u> , Ildar Zakirov, Nikolay Bagraev, Nikolay Egorov, Vasiliy Trofimov, Vladimir Bocharov, Alexei Nashchekin, <u>Eugeni Popov</u> <i>Ioffe institute, Russia</i>	p. 132
P1-15	Field emission patterns from carbon nanotubes calculated by time-dependent density functional theory <u>Toshiharu Higuchi</u> , Yoichi Yamada, Masahiro Sasaki <i>Independent</i>	p. 134
P1-16	Mechanism of non-saturated field electron emission from gated p-type Si tips <u>Zhijun Huang</u> , Yifeng Huang, Jun Chen, Ningsheng Xu, Shaozhi Deng, Juncong She <i>Sun Yat-Sen University, China</i>	p. 136
P1-17	Transport, Tunneling, and Trajectories: Modeling Emission from Surfaces with Structure <u>Kevin L. Jensen</u> , Donald A. Shiffler, Joel L. Lebowitz, John J. Petillo, M. Cahay <i>Naval Research Laboratory, USA</i>	p. 138
P1-18	Suppression of electron emission from cathode in photoemission-assisted Ar plasma <u>Nobuhisa Kamata</u> , Saijian Ajia, Shuichi Ogawa, Yuji Takakuwa <i>Tohoku University, Japan</i>	p. 140
P1-19	Effect of Pressure on Field Emission Pattern from ZnO Nanowires <u>Xiuging Cao</u> , Yicong Chen, Kun Wang, Keshuang Zheng, Juncong She, Shaozhi Deng, , Ningsheng Xu, Jun Chen <i>Sun Yat-Sen University, China</i>	p. 142

P1-20	Field emission characteristics of individual ZnO nanowire before vacuum breakdown <u>Yicong Chen</u> , Zhibing Li, Juncong She, Shaozhi Deng, Ningsheng Xu, Jun Chen <i>Sun Yat-Sen University, China</i>	p. 144
P1-21	Enhanced field emission properties of SiC nanowires decorated with Au nanoparticles <u>Yunkang Cui</u> , Jing Chen, Yunsong Di, Wei Lei, Xiaobing Zhang <i>Nanjing Institute of Technology, China</i>	N/A
P1-22	Field emission from vertically-aligned graphene edges on the graphitized pencil lead <u>Tomoya Igari</u> , Nishiyama Yuji, Kobayashi Nobuhiko, Yoichi Yamada, Masahiro Sasaki, Manabu Adachi <i>University of Tsukuba, Japan</i>	p. 148
P1-23	Field emission behavior of single n- and p-type black Si pillar structures <u>Pavel Serbun</u> , Vitali Porshyn, G. Müller, Dirk Lützenkirchen-Hecht, Christian Prommesberger, Christoph Langer, Robert Ławrowski, Rupert Schreiner <i>University of Wuppertal, Germany</i>	p. 150
P1-24	Field emission characteristics of CNT film emitters according to emission tip shapes <u>Jun Soo Han</u> , Sang Heon Lee, Han Bin Go, Yoon-Ho Song, Cheol Jin Lee <i>Korea University, Korea</i>	p. 152
P1-25	Activation of carbon nanotube film by gas discharge breakdown <u>Masatoshi Hiromura</u> , Seijhi Funaki, Hideki Sato <i>Mie University, Japan</i>	p. 154
P1-26	Thermo-enhanced field electron emission by band-to-band tunneling from p-Si/ZnO nano-emitters Zhizhen Huang, Yifeng Huang, Ningsheng Xu, Jun Chen, <u>Juncong She</u> , Shaozhi Deng <i>Sun Yat-Sen University, China</i>	p. 156
P1-27	Spin polarization of field-emitted electrons from Co₂MnSi emitter fabricated by focused ion beam technique <u>Hiromu Ikemizu</u> , Shigekazu Nagai, Koichi Hata, Tuyoshi Ishikawa, Takashi Sato, Tetsu Osuna, <i>Mie University, Japan</i>	p. 158
P1-28	Study on operating lifetime of Cs₃Sb emitters in panel device applications <u>Hyo-Soo Jeong</u> <i>The University of Suwon, Korea</i>	N/A
P1-29	Response time of amorphous selenium based photodetector driven by diamond cold cathode <u>Joshua D. John</u> , Noritoshi Miyachi, Kunitaka Enomoto, Masamune Tsuzaki, Ryu Mori, Reina Umezawa, Toru Takahashi, Ichitaro Saito, Tomoaki Masuzawa, Takatoshi Yamada, Ken Okano <i>International Christian University, Japan</i>	p. 162
P1-30	Fabrication of highly conductive carbon nanotube emitters for long-life cold cathode electron beam <u>Jung Su Kang</u> , Hye In Lee, Kyu Chang Park <i>Kyung Hee University, Korea</i>	p. 164

P1-31	Structural characterization and emission properties of phosphorus-doped NCD films <u>Hiromitsu Kato</u> , Takatoshi Yamada, Yasushi Ohkawa, Masahiko Ogura, Toshiharu Makino, Satoshi Yamasaki <i>National Institute of Advanced Industrial Science and Technology, Japan</i>	p. 166
P1-32	Structural changes of a nickel tip caused by forming graphene overlayers <u>Ryota Kawai</u> , Hirotaka Asai, Fumiya Matubara, Hidekazu Murata, Eiji Rokuta <i>Meijo University, Japan</i>	p. 168
P1-33	Evidence for single-electron tunneling in electron energy spectra of diamond tip field emitter <u>Victor I. Kleshch</u> , Vitaly Porshyn, Dirk Lützenkirchen-Hecht, Alexander N. Obraztsov <i>Lomonosov Moscow State University, Russia</i>	p. 170
P1-34	Structure and cathodoluminescent properties of ultraviolet emitting Zn(Al_{1-x}Ga_x)₂O₄ alloy phosphor <u>Hiroko Kominami</u> , Kaito Imagawa, Taiga Matsuura, Kazuhiko Hara, Shunsuke Kurosawa <i>Shizuoka University, Japan</i>	p. 172
P1-35	Depth profile of ZnAl₂O₄ layer on sapphire substrate by cathodoluminescence <u>Hiroko Kominami</u> , Kaito Imagawa, Kazuto Kijima, Kazuhiko Hara, Shunsuke Kurosawa <i>Shizuoka University, Japan</i>	p. 174
P1-36	The structure of Scandium thin films on the W(100) surface observed using emission microscopy <u>Martin Kordes</u> , Michael Mroz, Tatiana Savina, Samuel Tenney <i>Ohio University, USA</i>	p. 176
P1-37	The stable and long lifetime planar field emission cathode made of a CNT ink Karolina U. Laszczyk, <u>Michal Krysztof</u> , Jan A. Dziuban, Anna Górecka-Drzazga <i>Wroclaw University of Science and Technology, Poland</i>	p. 178
P1-38	Properties of one-free standing CNT cold cathode for high resolution devices <u>Ha Rim Lee</u> , Kyu Chang Park <i>Kyung Hee University, Korea</i>	p. 180
P1-39	Withdrawn	
P1-40	Simulation-based optimization of emitter density for randomly distributed field emitters <u>Johannes Bieker</u> , Benjamin Christa, Helmut F. Schlaak <i>Technische Universität Darmstadt, Germany</i>	p. 182
P1-41	A Study on the Electron Emission from Nanostructured Triple-Point Edges Bo-Kyoung Cha, <u>Jaegu Choi</u> <i>KERI, Korea</i>	N/A
P1-42	Electric-field-induced formation of carbon nanotube filaments <u>Seiji Funaki</u> , Yuuki Mizushima, Hideki Sato <i>Mie University, Japan</i>	p. 186

P1-43	Improvement of Electron Emission Efficiency of Graphene-Oxide-Semiconductor Planar-Type Electron Sources for Nanosatellite Neutralizers <u>Ryo Furuya</u> , Katsuhisa Murakami, Masayoshi Nagao, Yoshinori Takao <i>Yokohama National University, Japan</i>	p. 188
P1-44	Research on Nanoscale Edge Emission Vacuum Channel Triodes Panyang Han, <u>Xinghui Li</u> , Jun Cai, Jinjun Feng, Fujiang Liao <i>Beijing Vacuum Electronics Research Institute, China</i>	p. 190
P1-45	Si-Tips with Saturated High Concentration Arsenic Dopant at the Nano-Apexes for Uniform Field Electron Emission <u>Yifeng Huang</u> , Zhijun Huang, Miaoquan Zeng, Runze Zhan, Li Gong, Jun Chen, Ningsheng Xu, Juncong She, Shaozhi Deng <i>Sun Yat-Sen University, China</i>	p. 192
P1-46	Fabrication of stable carbon nanotube cold cathode electron emitters with electrical aging <u>Jung Hyun Kim</u> , Jung Su Kang, Kyu Chang Park <i>Kyung Hee University, Korea</i>	p. 194
P1-47	A planar field emission electron source in a triode structure with a carbon nanotube cathode and under-gate electrodes <u>Shoichi Kumon</u> , Norihiro Shimoi <i>Tohoku University, Japan</i>	p. 196
P1-48	Generation of light beams by electron beam excited surface plasmons <u>Yung-Chiang Lan</u> , Bo-Han Cheng, Yi-Chieh Lai, Hsin-Yu Kuo <i>National Cheng Kung University, Taiwan</i>	p. 198
P1-49	Nano Emitters on Silicon Pillar Structures generated by a Focused Electron Beam Induced Deposition <u>Robert Ławrowski</u> , Christoph Langer, Josef Sellmair, Rupert Schreiner <i>OTH Regensburg, Germany</i>	p. 200
P1-50	Backgated in-plane nanowire sidewall field emission: model and proof of concept <u>Jean-Paul Mazellier</u> , Prisca Perlempine, Riad Berrazouane, Martin Friedl, Anna Fontcuberta, Pascal Ponard <i>Thales Research & Technology, France</i>	N/A
P1-51	Evaluation of electron emission properties of graphene-oxide-silicon planar type cold cathode for an electron microscope <u>Joji Miyaji</u> , Katsuhisa Murakami, Masayoshi Nagao, Yoichiro Neo, Hidenori Mimura <i>Shizuoka University, Japan</i>	p. 204
P1-52	Fabrication of volcano structured Spindt-type field emitter arrays using Minimal Fab system <u>Masayoshi Nagao</u> , Katsuhisa Murakami, Somwan Khumpuang, Shiro Hara, Yasuhito Gotoh, Yoichiro Neo, Hidenori Mimura <i>National Institute of Advanced Industrial Science and Technology, Japan</i>	p. 206
P1-53	A Magnetic Focused CNT Travelling Wave Tube <u>Xinghui Li</u> , Bo Chen, Yuan Feng, Jinjun Feng, Yu Zhang, Shaozhi Deng <i>Beijing Vacuum Electronics Research Institute, China</i>	p. 208
P1-54	Electron Gun with Convergent Sheet Beam Based on Field Emitter Arrays with CNTs and Self-Aligned Gate for THz TWT <u>Anton Burtsev</u> , Aleksander Pavlov, Evgeny Kitsyuk, Aleksei Danilushkin, Kirill Shumikhin, Nikita Ryskin <i>Joint Stock Company "NPP Almaz", Russia</i>	N/A

P1-55	Electron-optical System of Terahertz and W-band TWT with Micro-sized Elliptical Electron Beams Igor A. Navrotsky, <u>Anton A. Burtsev</u> , Tatiana A. Karetnikova, Nikita M Ryskin, Aleksei V. Danilushkin, Kirill V. Shumikhin <i>Joint Stock Company "NPP Almaz", Russia</i>	N/A
P1-56	Gamma-ray irradiation effects of CdS/CdTe photodiode for radiation tolerant FEA image sensor <u>Tamotsu Okamoto</u> , Tomoya Igari, Takahiro Fukui, Yasuhito Gotoh, Nobuhiro Sato, Masafumi Akiyoshi, Ikuji Takagi <i>National Institute of Technology, Kisarazu College, Japan</i>	p. 214
P1-57	Cathodoluminescent UV-radiation Sources Using a Carbon Fiber Field Emission Cathode Michail I. Danilkin, Natalia Yu. Vereschagina, Dmitry I. Ozol, <u>Chan Kyaw Nyein</u> , Win Aung Htet, Evgenii P. Sheshin <i>Moscow Institute of Physics and Technology, Russia</i>	N/A
P1-58	Self-focusing of electrons emitted by rectangular pyroelectric crystals: A study on geometrical conditions for optimized X-ray intensities <u>Karsten Harnisch</u> , Markus Wilke, Wolfram Knapp, Martin Ecke, Lucas Hanns, Thorsten Halle <i>Otto-von-Guericke University Magdeburg, Germany</i>	p. 218
P1-59	Withdrawn	
P1-60	A novel vacuum-sealed field emission x-ray tube with graphene-gated carbon nanotube emitters <u>Hyojin Jeon</u> , Eunsol Go, Jeong-Woong Lee, Yujung Ahn, Sora Park, Jae-Woo Kim, Jun-Tae Kang, Jin-Woo Jeong, Ki Nam Yun, Ji-Whan Yeon, Sunghee Kim, Yoon-Ho Song <i>UST & ETRI, Korea</i>	p. 220
P1-61	Development of ultrafast electronic oscillator by exploiting advantage of cold cathodes <u>Seok-Gy Jeon</u> , Jaehoon Kim <i>Korea Electrotechnology Research Institute (KERI), Korea</i>	p. 222
P1-62	Dynamically stabilized high vacuum inside MEMS optical cells for atomic spectroscopy Pawel Knapkiewicz, Jan Dziuban, Tomasz Grzebyk <i>Wroclaw University of Science and Technology, Poland</i>	p. 224
P1-63	Nanogranular Compound Material Layers Serve as Storage for Infra-red to Ultra-Violet Photons for the Energy Supply for Electric Machines <u>Hans W. P. Koops</u> <i>HaWilKo GmbH, Germany</i>	p. 226
P1-64	Preliminary imaging in miniature MEMS electron microscope <u>Michał Krysztof</u> , Anna Górecka-Drzazga, Jan Dziuban, Tomasz Grzebyk <i>Wroclaw University of Science and Technology, Poland</i>	p. 228
P1-66	Fabrication of high current carbon nanotube emitters for gyrotron devices <u>Hye In Lee</u> , Jung Su Kang, Kyu Chang Park <i>Kyung Hee University, Korea</i>	p. 230

P1-67	CNT field emitter based high performance x-ray source <u>Sang Heon Lee</u> , Jun Soo Han, Juhyun Jeon, Han Bin Go, Yoon-Ho Song, Cheol Jin Lee <i>Korea University, Korea</i>	p. 232
P1-68	Quantum dots photodetector with field-emission nano gap <u>Wei Lei</u> , Xin Wang, Xiaobing Zhang, Zhuoya Zhu <i>Southeast University, China</i>	p. 234
P1-70 (O1-3)	Investigation of structural evolution of polycrystalline tungsten tips with palladium oxide reservoirs by use of field ion microscopy <u>Hirofuka Asai</u> , Ryota Kawai, Fumiya Matsubara, Hidekazu Murata, Eiji Rokuta <i>Meijo University, Japan</i>	N/A
P1-71 (O1-4)	FEM and FIM of Graphene: Possible Observation of Electronic States at Edges <u>Yahachi Saito</u> , Yuhdai Watanabe, Tooru Hoshino, Hitoshi Nakahara, Kazuya Kunoh, Shigekazu Nagai, Koichi Hata <i>Nagoya University, Japan</i>	N/A

Poster Session 2

17:00 – 19:00 Wednesday, 11th July, 2018
Foyer, Room A and Room G

P2-1	Comparison of emission characteristics of molybdenum and tungsten field emitter using the S-K chart <u>Takashi Kawakubo</u> , Ryo Onishi, Misato Manabe, Hideaki Nakane <i>National Institute of Technology, Kagawa College, Japan</i>	p. 238
P2-2	Theory of space-charge-limited electron emission from sharp emitters <u>Andreas Kyritsakis</u> , Mihkel Veske, Kyrre Ness Sjobaek, Flyura Djurabekova <i>University of Helsinki, Finland</i>	N/A
P2-3	Synthesis of Electron-optical Systems with Compression Sheet Beam Based on Field Emission Cathodes for Terahertz Amplifiers <u>Anton A. Burtsev</u> , Aleksei V. Danilushkin, Kirill V. Shumikhin <i>Yuri Gagarin State Technical University of Saratov, Russia</i>	N/A
P2-4	Modeling of Secondary Electron Emission Yield From Thin Film Coated Anode Materials <u>Jonathan Ludwick</u> , Marc Cahay, Steven B. Fairchild, Tyson C. Back, Paul Murray <i>University of Cincinnati, USA</i>	N/A
P2-5	Field-emission of spin-polarized electrons from Cr thin film grown on W{113} surfaces <u>Shigekazu Nagai</u> , Kento Miyazaki, Kazuya Kunoh, Tatsuo Iwata, Koichi Hata <i>Mie University, Japan</i>	p. 246
P2-6	Work Function Measurement of Er-oxide/W(100) Surface by using of Photoemission Electron Microscope and Field Emission Microscopy <u>Hideaki Nakane</u> , Takashi Kawakubo <i>Muroran Institute of Technology, Japan</i>	p. 248
P2-7	Field dependence of evaporated ion species in field-induced chemical etching of tungsten with oxygen and nitrogen <u>Kazuki Ohtani</u> , Shigekazu Nagai, Tatsuo Iwata, Koichi Hata <i>Mie University, Japan</i>	p. 250
P2-8	Numerical Modeling of Field Emission from Silicon, Incorporating Bound States near the Surface and a Finite Electron Supply <u>Alex A. Patterson</u> , Akintunde I. Akinwande <i>Massachusetts Institute of Technology, USA</i>	N/A
P2-9	Experimental definition of k-power of pre-exponential voltage factor for LAFE <u>Eugeni O. Popov</u> , Anatoly G. Kolosko, Sergey V. Filippov <i>Ioffe Institute, Russia</i>	p. 254
P2-10	Comparison of experimental and theoretical methods for determining the emission area of multi-tip field cathodes <u>Eugeni O. Popov</u> , Sergey V. Filippov, Anatoly G. Kolosko, Pavel Alexandrovich Romanov <i>Ioffe Institute, Russia</i>	p. 256
P2-11	Origin of the FEM pattern from C₆₀ molecules adsorbed on tungsten tips <u>Yuji Nishiyama</u> , Manabu Adachi, Nobuhiko Kobayashi, Yoichi Yamada, Masahiro Sasaki <i>University of Tsukuba, Japan</i>	p. 258

P2-12	Simulation of a Vacuum Transistor <u>Menelaos S. Tsagarakis</u> , J. P. Xanthakis <i>National Technical University Of Athens, Greece</i>	p. 260
P2-13	High-fidelity molecular dynamics of vacuum nanoelectronics Kristinn Torfason, Andrei Manolescu, <u>Ágúst Valfells</u> <i>Reykjavík University, Iceland</i>	p. 262
P2-14	Electron Ray Tracing in a Cylindrical Deflector Analyzer for Field Emission Spectroscopy <u>Seiji Watanabe</u> , Hidekazu Murata, Hirotaka Asai, Eiji Rokuta, Hiroshi Shimoyama <i>Meijo University, Japan</i>	p. 264
P2-15	First-Principles Calculations on Work Functions of Magnetite Surfaces <u>Liangliang Xu</u> , Nan Zhao, Ming-Chieh Lin, Tsan-Chuen Leung <i>Hanyang University, Korea</i>	N/A
P2-16	An analytical model for ultrafast electron emission due to two-color laser fields <u>Peng Zhang</u> , Yi Luo <i>Michigan State University, USA</i>	N/A
P2-17	In-situ Characterization of Structure Evolution of Graphene During Field Emission <u>Yu Zhang</u> , Runze Zhan, Shuai Tang, Ningsheng Xu, Jun Chen, Shaozhi Deng <i>Sun Yat-Sen University, China</i>	p. 270
P2-18	First principles calculations on work functions of graphene nanostructures <u>Nan Zhao</u> , Liangliang Xu, Ming-Chieh Lin, Tsan-Chuen Leung <i>Hanyang University, Korea</i>	N/A
P2-19	Controllably synthesis of one-dimensional SmB₆ topological insulator nanostructures for field emission application Tong Zhang, Zijuan Li, Yun Yang, Haibo Gan, Ningsheng Xu, Jun Chen, Shaozhi Deng, <u>Fei Liu</u> <i>Sun Yat-Sen University, China</i>	N/A
P2-20	Size Controlled Single-layer Graphene Oxide for Electronic Applications <u>Jianlong Liu</u> , Ruirui Jiang, Baoqing Zeng <i>University of Electronic Science and Technology of China, China</i>	N/A
P2-21	Nanoscale Vacuum Tube with ZnO nanorods <u>Masahiro Ohara</u> , Hiroyuki Bando, Hisao Ishii, Kazunuki Yamamoto <i>Chiba University, Japan</i>	p. 278
P2-22	Ultrafast field emission from carbon nanotubes Chi Li, Xu Zhou, Feng Zhai, Zhenjun Li, Fengrui Yao, Ruixi Qiao, Ke Chen, Dapeng Yu, Zhipei Sun, Kaihui Liu, <u>Qing Dai</u> <i>National Center for Nano Science and Technology, China</i>	N/A
P2-23	High-performance carbon nanotube paste emitters by using the optimal size distribution of SiC nanometer-fillers aggregates <u>Eunsol Go</u> , Jae-Woo Kim, Hyojin Jeon, Jeong-Woong Lee, Yujung Ahn, Sora Park, Jun-Tae Kang, Jin-Woo Jeong, Ki Nam Yun, Sunghee Kim, Ji-Hwan Yeon, Yoon-Ho Song <i>UST & ETRI, Korea</i>	p. 282

P2-24	Field Emission Energy Distribution from Planar Integrated Graphene <u>Jonathan L. Shaw</u> , John Brad Boos, Byoung-Dong Kong, Glenn G Jernigan, Jeremy T. Robinson <i>Naval Research Laboratory, USA</i>	p. 284
P2-25	Electron emission from nanocrystalline silicon planar cathode in gaseous environments <u>Hidetaka Shimawaki</u> , Yoichiro Neo, Hidenori Mimura <i>Hachinohe Institute of Technology, Japan</i>	p. 286
P2-26	Bi-Alkali photocathode for a bunched electron beam <u>Hayato Takahashi</u> , Ryo Yoshitake, Yoichiro Neo, Hidenori Mimura <i>Shizuoka University, Japan</i>	p. 288
P2-27	Effect of thermal pre-treatment on thermionic emission current stability from carbon nanotube forests <u>Kevin Voon</u> , Oleksandr Foyevtsov, Harrison Fan, Kais Dridi, Mike Chang, Mokter Chowdhury, Pinder Dosanjh, George Sawatzky, Alireza Nojeh <i>University of British Columbia, Canada</i>	p. 290
P2-28	An 8-inch diagonal ZnO nanowire cold cathode panel for flat-panel X-ray source Daokun Chen, Guofu Zhang, Zhipeng Zhang, Keshuang Zheng, Shaozhi Deng, Juncong She, Ningsheng Xu, <u>Jun Chen</u> <i>Sun Yat-Sen University, China</i>	p. 292
P2-29	The controlled growth of α-Fe₂O₃ nanoflakes by electric field assisted thermal oxidation and its field emission performance Liqiang Chen, Chunhong Wu, Tailing Zhang, Yikun Zha, Yuxia Zhang, <u>Junqing Wu</u> <i>Jiujiang University, China</i>	N/A
P2-30	Temperature dependent field emission properties of α-Fe₂O₃ nanoflakes Chunhong Wu, Tailin Zhang, Liqiang Chen, Yikun Zha, Lingling Zhang, <u>Junqing Wu</u> <i>Jiujiang University, China</i>	N/A
P2-31	Study on Photoemission of Patterned Carbon Nanotubes Modified with Gold Nanoparticles Lin Xu, Zhiyang Qi, Qilong Wang, Yusheng Zhai, Mengjie Li, Jian Zhang, <u>Xiaobing Zhang</u> <i>Southeast University, China</i>	p. 298
P2-32	Fabrication of vertically aligned graphene sheets and their field emission properties <u>Takatoshi Yamada</u> , Masataka Hasegawa <i>National Institute of Advanced Industrial Science and Technology, Japan</i>	p. 300
P2-33	Development of a Low-Work-Function Thermionic Cathode by Coating with LaB₆ and Carbide <u>Tomoya Yokoyama</u> , Takaya Kobayashi, Hidekazu Murata, Eiji Rokuta, Hiroshi Shimoyama, Hiroshi Yasuda, Yoshihisa Ooae <i>Meijo University, Japan</i>	p. 302
P2-34	Field Emission from n-Type Si Surface Sandblasted by Al₂O₃ Fine Particles <u>Tomomi Yoshimoto</u> , Tastuo Iwata <i>Toyo University, Japan</i>	p. 304

P2-35	Field Emission Performance of Boron Nitride Nanotube Emitters According to Vacuum Pressure <u>Ki Nam Yun</u> , Jin-Woo Jeong, Jun-Tae Kang, Sora Park, Jae-Woo Kim, Yoon-Ho Song, Jun Soo Han, Cheol Jin Lee <i>Electronics and Telecommunications Research Institute (ETRI), Korea</i>	p. 306
P2-36	Field Emission from Porous Sponge-Like Graphene <u>Yajie Guo</u> , Yunsong Di, Jitao Ji, Xiaobing Zhang, Wei Lei, Xinli Guo <i>Nanjing Normal University, China</i>	p. 308
P2-37	Field Emission Properties of a Single Silicon Carbide Nanowire <u>Peng Zhao</u> , Yu Zhang, Shuai Tang, Jun Chen, Juncong She, Ningsheng Xu, Shaozhi Deng <i>Sun Yat-Sen University, China</i>	p. 310
P2-38	Field Emission Properties of Indium-Doped ZnO Nanowires Prepared on ITO Glass Substrate <u>Yangyang Zhao</u> , Guofu Zhang, Runze Zhan, Juncong She, Shaozhi Deng, Ningsheng Xu, Jun Chen <i>Sun Yat-Sen University, China</i>	p. 312
P2-39	Field emission from Au nanoparticles decorated ZnO nanowires <u>Keshuang Zheng</u> , Zhipeng Zhang, Xiaojie Li, Juncong She, Shaozhi Deng, Ningsheng Xu, Jun Chen <i>Sun Yat-Sen University, China</i>	p. 314
P2-40	Withdrawn	
P2-41	Stable and low noise field emission from single p-type Si-tips <u>Christian Prommesberger</u> , Christoph Langer, Rupert Schreiner <i>OTH Regensburg, Germany</i>	p. 316
P2-42	Study on Photoemission and Tunneling in Light-Modulated Scanning Tunneling Microscopy Zhiyang Qi, Lin Xu, <u>Qilong Wang</u> , Jian Zhang, Yusheng Zhai, Mengjie Li, Ji Xu, Yan Tu <i>Southeast University, China</i>	p. 318
P2-43	Photosensitivity of single silicon high-aspect-ratio tips with different doping levels <u>Pavel Serbun</u> , Vitali Porshyn, Christian Prommesberger, Christoph Langer, Robert Ławrowski, Rupert Schreiner, Dirk Lützenkirchen-Hecht <i>University of Wuppertal, Germany</i>	p. 320
P2-44	Interface Control for Enhancing Field Emission Properties from Single-Crystalline Molybdenum Nanopyramid Emitters <u>Yan Shen</u> , Runze Zhan, Ningsheng Xu, Yu Zhang, Fei Liu, Jun Chen, Juncong She, Shaozhi Deng <i>Sun Yat-Sen University, China</i>	p. 322
P2-45	High-Performance Field Emitters of Multiwalled Carbon Nanotubes Grown by Varying Oxygen Gas Pressure Using Arc Discharge <u>Taehun Shin</u> , Mehdi Zain, Naesung Lee <i>Sejong University, Korea</i>	p. 324
P2-46	Fabrication of Spindt-type emitter cathode using HPPMS process with Krypton gas for reduction of compressive stress <u>Hyuga Taniguchi</u> , Takeo Nakano, Kei Oya, Masayoshi Nagao, Hisashi Ohsaki, Katsuhisa Murakami <i>Seikei University, Japan</i>	N/A

P2-47	Electron energy analysis at the nanometer scale using a near field emission scanning electron microscope (NFESEM) Ashish Suri, Andrew Pratt, Steven P. Tear, <u>Christopher G. H. Walker</u> , Thomas Bähler, Mohamed M. El Gomati <i>ETH Zürich, Switzerland</i>	p. 328
P2-48	The experiment study of double grid to enhance electron transmission in field emission <u>Mei Xiao</u> , Wei Lei, Zhi Wei Zhao, Zuo Ya Zhu, Kai Xia, Xiao Bing Zhang <i>Southeast University, China</i>	p. 330
P2-49	Stability of carbon nanotube cold cathode electron beam (C-beam) with vacuum brazing process <u>Yi Yin Yu</u> , Kyu Chang Park <i>Kyung Hee University, Korea</i>	p. 332
P2-50	High-frequency photocathode based on CNT-yarn emitter and GaAs photoswitch <u>Oktay Yilmazoglu</u> , Shihab Al-Daffaie, Franko Küppers, Yoichiro Neo, Hidenori Mimura <i>Technische Universität Darmstadt, Germany</i>	p. 334
P2-51	Composite electron modulation structure in cold-cathode X-ray tube <u>Zhuoya Zhu</u> , Wanli Gao, Wei Lei, Xiaobing Zhang, Mei Xiao, Zhiwei Zhao <i>Southeast University, China</i>	N/A
P2-52	Design and development of field emission based rising sun magnetron for space-based wireless power transmission using CFDTD PIC simulations <u>Ling Li</u> , Kaviya Aranganadin, Hua-Yi Hsu, Ming-Chieh Lin <i>Hanyang University, Korea</i>	N/A
P2-53	Glow Discharge Formation in Nanodiamond Vacuum Diode <u>Sergey V. Baryshev</u> , Stanislav S. Baturin <i>Michigan State University, USA</i>	N/A
P2-54	Field emission assisted micro plasma discharges at vacuum and atmospheric pressures <u>Matthias Lindner</u> , Dominik Berndt, Christoph Langer, Christian Prommesberger, Rupert Schreiner <i>OTH Regensburg, Germany</i>	p. 342
P2-55	Development of micro focus X-ray microscope equipped with high brightness Li/W<111> field emitter Shinichiro Ohta, Shigekazu Nagai, Tatsuo Iwata, Koichi Hata <i>Mie University, Japan</i>	p. 344
P2-56	A carbon nanotube field emission ionization gauge with coaxial electrodes Jian Zhang, Jianfeng He, <u>Changkun Dong</u> <i>Wenzhou University, China</i>	p. 346
P2-57	Portable X-ray devices based on carbon nanoclusters <u>Georgiy Fursey</u> , Aubekir Begidov, Mikhail Polyakov <i>Saint-Petersburg State University of Telecommunications, Russia</i>	N/A
P2-58	Graphene paper as emitter for low-power X-ray sources <u>Pavel Serbun</u> , Vitali Porshyn, Dirk Lützenkirchen-Hecht, Denis Bandurin <i>University of Wuppertal, Germany</i>	p. 350

P2-59	Recent upgrade and commissioning of the Argonne Cathode Test-stand Jiahang Shao, <u>Sergey Baryshev</u> , Eric Wisniewski, Conde Manoel, John Power, Wanming Liu, Scott Doran, Charles Whiteford, Sergey Antipov, Gongxiaohui Chen, Edgar Gomez, Chunguang Jing, Lianmin Zheng, Wei Gai <i>Argonne National Laboratory, USA</i>	N/A
P2-60	Withdrawn	
P2-61	Investigations on electrical properties and correlations to electron and X-ray energies of pyroelectric LiTaO₃ and LiNbO₃ <u>Markus Wilke</u> , Karsten Harnisch, Wolfram Knapp, Martin Ecke, Torsten Senft, Thorsten Halle <i>Otto-von-Guericke University Magdeburg, Germany</i>	p. 354
P2-62	Vacuum photoemissive device with a DLC film-based nanostructure N. P. Aban'shin, Garif G. Akchurin, Yuri A. Avetisyan, Georgy G. Akchurin, <u>Alexander N. Yakunin</u> <i>Institute of Precision Mechanics and Control, Russian Academy of Sciences, Russia</i>	N/A
P2-63	Study on a 5.8GHz Injection-locked Magnetron for Transferring Data <u>Bo Yang</u> , Tomohiko Mitani, Naoki Shinohara <i>Kyoto University, Japan</i>	p. 358
P2-64	Flat panel UV-C light source with CNT cold cathode electron beam (C-beam) <u>Sung Tae Yoo</u> , Kyu Chang Park <i>Kyung Hee University, Korea</i>	p. 360
P2-65	Simulation study on a double-gridded carbon nanotube cold cathode electron gun Qingyum Chen, <u>Xuesong Yuan</u> , Yu Zhang, Shaozhi Deng, Lin Meng, Yang Yan <i>University of Electronic Science and Technology of China, China</i>	N/A
P2-66	A 40W/220GHz carbon nanotube cold-cathode gyrotron <u>Xuesong Yuan</u> , Yu Zhang, Jianqiang Wu, Lin Meng, Shaozhi Deng, Yang Yan <i>University of Electronic Science and Technology of China, China</i>	N/A
P2-68	Work function of polarized boron 2D atomic crystal Somayeh Saboori, Zhibing Li, <u>Weiliang Wang</u> , Yu Xia, Juncong She, <i>Sun Yat-Sen University, China</i>	p. 366
P2-70 (O4-4)	Fabrication of Electrospray Thrusters with a High-Density Emitter Array Utilizing Minimal-Fab System <u>Naoki Inoue</u> , Masayoshi Nagao, Katsuhisa Murakami, Sommawan Khumpuang, Shiro Hara, Yoshinori Takao <i>Yokohama National University & AIST, Japan</i>	N/A