

# **14th International Conference on Narrow Gap Semiconductors and Systems 2009**

**Physics Procedia Volume 3, Issue 2**

**Sendai, Japan  
13 – 17 July 2009**

**Editors:**

**J. Nitta**

**ISBN: 978-1-62748-693-4**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© by Elsevier B.V.  
All rights reserved.

Printed by Curran Associates, Inc. (2014)

For permission requests, please contact Elsevier B.V.  
at the address below.

Elsevier B.V.  
Radarweg 29  
Amsterdam 1043 NX  
The Netherlands

Phone: +31 20 485 3911  
Fax: +31 20 485 2457

<http://www.elsevierpublishingsolutions.com/contact.asp>

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

<b>EDITORIAL</b> .....	1103
<b>14<sup>TH</sup> INTERNATIONAL CONFERENCE ON NARROW GAP SEMICONDUCTORS AND SYSTEMS (NGS<sup>2</sup> -14) COMMITTEES</b> .....	1105
<b>CONFERENCE PHOTO</b> .....	1107
<b>DIRECTION REVERSAL OF THE SURFACE BAND BENDING IN GAAS-BASED DILUTE NITRIDE EPITAXIAL LAYERS INVESTIGATED BY POLARITY OF TERAHERTZ ELECTROMAGNETIC WAVES</b> .....	1109
<i>Hideo Takeuchi, Junichi Yanagisawa, Masaaki Nakayama</i>	
<b>A QUEST OF A NEW EYE FOR TERAHERTZ-WAVES REGION</b> .....	1115
<i>Kiyomi Sakai</i>	
<b>FORMATION OF SELF ASSEMBLED PBTE QUANTUM DOTS IN CDTE ON SI(111)</b> .....	1121
<i>F. Felder, A. Fognini, M. Rahim, M. Fill, E. Müller, H. Zogg</i>	
<b>LEAD SALT RESONANT CAVITY ENHANCED DETECTOR WITH MEMS MIRROR</b> .....	1127
<i>F. Felder, M. Fill, M. Rahim, H. Zogg, N. Quack, S. Blumier, J. Dual</i>	
<b>UNUSUAL DIAMAGNETISM IN SEMICONDUCTOR NANO-OBJECTS</b> .....	1133
<i>L. M. Thu, O. Voskoboynikov</i>	
<b>MAGNETO-OPTICAL STUDY UNDER PULSED HIGH MAGNETIC FIELDS OF <math>\beta</math>-FESI<sub>2</sub> SINGLE CRYSTALS GROWN BY A CHEMICAL VAPOR TRANSPORT METHOD</b> .....	1139
<i>Y. Hara, K. Nakaoka, A. Ohnishi, M. Sasaki, R. Shen, Y. H. Matsuda, S. Takeyama</i>	
<b>ABOVE ROOM TEMPERATURE LEAD SALT VCSELS</b> .....	1145
<i>M. Rahim, A. Khair, F. Felder, M. Fill, D. Chappuis, H. Zogg</i>	
<b>BINDING ENERGY OF MAGNETO-BIEXCITONS IN SEMICONDUCTOR NANO-RINGS</b> .....	1149
<i>L. M. Thu, W. T. Chiu, Shao-Fu Xue, Ta-Chun Lin, O. Voskoboynikov</i>	
<b>LONG WAVELENGTH ELECTRICALLY PUMPED GASB-BASED BURIED TUNNEL JUNCTION VCSELS</b> .....	1155
<i>Alexander Bachmann, Shamsul Arafin, Kaveh Kashani-Shirazi, Markus-Christian Amann</i>	
<b>PROBE OF INTERBAND RELAXATIONS OF PHOTO-EXCITED CARRIERS AND SPINS IN INSB BASED QUANTUM WELLS</b> .....	1161
<i>M. Bhowmick, R. N. Kini, K. Nontapot, N. Goel, S. J. Chung, T. D. Mishima, M. B. Santos, G. A. Khodaparast</i>	
<b>TIME RESOLVED SPECTROSCOPY OF INMNAS USING DIFFERENTIAL TRANSMISSION TECHNIQUE IN MID-INFRARED</b> .....	1167
<i>M. Bhowmick, T. R. Merritt, K. Nontapot, B. W. Wessels, O. Drachenko, G. A. Khodaparast</i>	
<b>OPTICAL MAPPING OF THE BOUNDARY OF A TWO-DIMENSIONAL ELECTRON GAS BY A NEARFIELD OPTICAL MICROSCOPY</b> .....	1171
<i>H. Ito, Y. Shibata, K. Furuya, S. Kashiyawa, Y. Ootuka, S. Nomura</i>	
<b>POSITION DEPENDENT OPTICAL EFFECT ON THE TRANSPORT PROPERTIES OF S-SM-S JUNCTIONS</b> .....	1177
<i>K. Tsumura, S. Nomura, T. Akazaki, H. Takayanagi</i>	
<b>PHOTOLUMINESCENCE SPECTROSCOPY OF THE LOW-DENSITY TWO-DIMENSIONAL ELECTRON SYSTEM IN ELECTRIC FIELDS</b> .....	1183
<i>M. Yamaguchi, S. Nomura, H. Tamura, T. Akazaki</i>	
<b>INTENSE INTERFACE LUMINESCENCE IN TYPE II NARROW-GAP INAS-BASED HETEROSTRUCTURES AT ROOM TEMPERATURE</b> .....	1189
<i>Konstantin Moiseev, Eduard Ivanov, Vyacheslav Romanov, Maya Mikhailova, Yury Yakovlev, Eduard Hulicius, Alica Hospodková, Jiri Pangrác, Tomislav Šimeček</i>	
<b>ROOM TEMPERATURE INTERBAND CASCADE LASERS</b> .....	1195
<i>M. Kim, C. L. Canedy, C. S. Kim, W. W. Bewley, J. R. Lindle, J. Abell, I. Vurgaftman, J. R. Meyer</i>	
<b>CYCLOTRON RESONANCE IN P-DOPED INSB QUANTUM WELLS</b> .....	1201
<i>M. B. Santos, M. Edirisooriya, T. D. Mishima, C. K. Gaspe, J. Coker, R. E. Doezema, X. Pan, G. D. Sanders, C. J. Stanton, L. C. Tung, Y-J. Wang</i>	
<b>BAND GAP TUNABILITY OF TYPE II ANTIMONIDE-BASED SUPERLATTICES</b> .....	1207
<i>Manijeh Razeghi, Binh-Minh Nguyen</i>	
<b>ACCUMULATION OF LOCALIZED ELECTRONS IN SN DOPED INSB/AL<sub>x</sub>IN<sub>1-x</sub>SB QUANTUM WELLS</b> .....	1213
<i>S. Ishida, T. Manago, N. Nishizako, H. Geka, I. Shibasaki</i>	

<b>DOPING LEVEL DEPENDENCE OF TRANSPORT PROPERTIES IN INASB QUANTUM WELLS</b> .....	1219
<i>T. Manago, N. Nishizako, S. Ishida, H. Geka, I. Shibasaki, K. Makise, K. Mitsuishi</i>	
<b>QUANTUM INTERFERENCE AND KONDO EFFECTS IN AN AHARONOV–BOHM–CASHER INTERFEROMETER CONTAINING A Laterally Coupled Double Quantum Dot</b> .....	1225
<i>T. Kubo, Y. Tokura, S. Tarucha</i>	
<b>OSCILLATORY QUANTUM INTERFERENCE EFFECTS IN NARROW-GAP SEMICONDUCTOR HETEROSTRUCTURES</b> .....	1231
<i>R. B. Lillianfeld, R. L. Kallaher, J. J. Heremans, Hong Chen, N. Goel, S. J. Chung, M. B. Santos, W. Van Roy, G. Borghs</i>	
<b>SPIN AND PHASE COHERENCE TIMES IN TE DOPED INSB THIN FILMS</b> .....	1237
<i>R. L. Kallaher, J. J. Heremans</i>	
<b>KLEIN TUNNELING IN GRAPHENE UNDER SUBSTRATE ELECTRIC FIELD</b> .....	1243
<i>A. Yamakage, K. I. Imura, J. Cayssol, Y. Kuramoto</i>	
<b>WEAK LOCALIZATION PROPERTIES OF GRAPHENE WITH INTRINSIC AND RASHBA SPIN-ORBIT COUPLINGS</b> .....	1249
<i>Ken-Ichiro Imura, Yoshio Kuramoto, Kentaro Nomura</i>	
<b>ANISOTROPIC SPIN SPLITTING IN INGAAS WIRE STRUCTURES</b> .....	1255
<i>Yoji Kunihashi, Makoto Kohda, Junsaku Nitta</i>	
<b>EXPERIMENTAL DEMONSTRATION OF RESONANT SPIN-ORBIT INTERACTION EFFECT</b> .....	1261
<i>Yoji Kunihashi, Makoto Kohda, Junsaku Nitta</i>	
<b>TIGHTLY BOUND 3D QUANTUM DOT ENERGY STATES IN A MAGNETIC FIELD</b> .....	1267
<i>Norman J. Morgenstern Horing, S. Y. Liu, M. Sawamura</i>	
<b>DRIFT INSTABILITY OF A 2D MAGNETOPLASMA IN A PERIODIC POTENTIAL</b> .....	1271
<i>Vassilios Fessatidis, Norman J. M. Horing, Makoto Sawamura</i>	
<b>GRAPHENE ENERGY LOSS SPECTROSCOPY: PERPENDICULAR CASE</b> .....	1279
<i>Vassilios Fessatidis, Norman J. M. Horing, Makoto Sawamura</i>	
<b>SPIN-POLARIZATION IN INAS/ALSB DOUBLE BARRIER RESONANT TUNNELING STRUCTURES: INFLUENCE OF BARRIER MATERIAL AND INTERFACE STRUCTURE</b> .....	1287
<i>Satofumi Souma, Matsuto Ogawa</i>	
<b>MEASUREMENT OF SPIN POLARIZATION IN P-IN<sub>0.96</sub>MN<sub>0.04</sub>AS USING ANDREEV REFLECTION SPECTROSCOPY</b> .....	1291
<i>Tatsushi Akazaki, Takehito Yokoyama, Yukio Tanaka, Hiroo Munekata, Hideaki Takayanagi</i>	
<b>SEMIMETALLIC PROPERTIES OF SNTE/PBSE TYPE-II SUPERLATTICES</b> .....	1295
<i>Akihiro Ishida, Tomohiro Yamada, Takuro Tsuchiya, Yoku Inoue, Takuji Kita</i>	
<b>LOW-TEMPERATURE SCANNING TUNNELING MICROSCOPY OF SELFASSEMBLED INAS QUANTUM DOTS GROWN BY DROPLET EPITAXY</b> .....	1299
<i>C. Durand, A. Peilloux, K. Suzuki, K. Kamisawa, B. Grandidier, K. Muraki</i>	
<b>ANOMALOUS MAGNETO-TRANSPORT PROPERTIES IN NEARLY GAPLESS MATERIALS</b> .....	1305
<i>M. Sasaki, A. Ohnishi, N. Satoh, K. Suga, K. Kindo, K. Inomata, H. Ebina, S. J. Lee</i>	
<b>GIANT TRANSIENT NERNST–ETTINGSHAUSEN EFFECT IN NEARLY GAPLESS MATERIALS</b> .....	1311
<i>M. Sasaki, A. Ohnishi, N. Satoh, K. Suga, K. Kindo, K. Inomata, H. Ebina, S. J. Lee</i>	
<b>ELECTRICAL SPIN MANIPULATION WITH AL<sub>2</sub>O<sub>3</sub> GATE INSULATOR IN INGAAS BASED MESOSCOPIC RING ARRAYS</b> .....	1317
<i>Jun Takagi, Makoto Kohda, Junsaku Nitta</i>	
<b>SPIN DEPENDENT ELECTRONIC STRUCTURE AND LEVEL CROSSINGS AS A FUNCTION OF MAGNETIC FIELD IN INAS NANOWIRE</b> .....	1321
<i>S. Q. Jin, J. Waugh, T. Matsuura, S. Faniel, H. Z. Wu, Takaaki Koga</i>	
<b>RECTANGULAR MODEL OF A BALLISTIC SPIN INTERFEROMETER IN (001) INGAAS/INALAS QUANTUM WELLS</b> .....	1325
<i>Takaaki Koga, S. Faniel, S. Mineshige, T. Matsuura, Y. Sekine</i>	
<b>HETEROEPITAXIAL GROWTH OF INSB FILMS ON THE PATTERNED SI(001) SUBSTRATE</b> .....	1329
<i>T. Iwasugi, M. Mori, H. Igarashi, K. Murata, M. Saito, K. Maezawa</i>	
<b>INSB FILMS GROWN ON THE V-GROOVED SI(001) SUBSTRATE WITH INSB BILAYER</b> .....	1335
<i>M. Mori, S. Khamseh, T. Iwasugi, K. Nakatani, K. Murata, M. Saito, K. Maezawa</i>	
<b>EFFECT OF THERMAL ANNEALING ON THE PROPERTIES OF NARROW-BANDGAP ZNSNAS<sub>2</sub> EPITAXIAL FILMS ON INP(001) SUBSTRATES</b> .....	1341
<i>Yuji Agatsuma, Joel T. Asubar, Yoshio Jinbo, Naotaka Uchitomi</i>	
<b>GROWTH AND CHARACTERIZATION OF GASB/ALSB MULTIPLE QUANTUM WELL STRUCTURES ON SI(111) AND SI(001) SUBSTRATES</b> .....	1345
<i>H. Toyota, S. Fujie, M. Haneta, A. Mikami, T. Endoh, Y. Jinbo, N. Uchitomi</i>	

<b>HIGH-RESOLUTION X-RAY DIFFRACTION STUDIES OF ZNSNAS<sub>2</sub> EPITAXIAL FILMS NEARLY LATTICE-MATCHED TO INP SUBSTRATES .....</b>	1351
<i>Joel T. Asubar, Yuji Agatsuma, Hiroshi Yamaguchi, Shin'ichi Nakamura, Yoshio Jinbo, Naotaka Uchitomi</i>	
<b>ANGLE-RESOLVED PHOTOEMISSION STUDY AND PSEUDOPOTENTIAL CALCULATIONS OF GETE AND GE<sub>1-x</sub>MN<sub>x</sub>TE BAND STRUCTURE .....</b>	1357
<i>B. J. Kowalski, M. A. Pietrzyk, W. Knoff, A. Lusakowski, J. Sadowski, J. Adell, T. Story</i>	
<b>FIRST-PRINCIPLES STUDY OF NITROGEN-INDUCED BAND-GAP REDUCTION IN III-V SEMICONDUCTORS .....</b>	1363
<i>M. Ishikawa, T. Nakayama</i>	
<b>COMPOSITIONAL OPTIMIZATION OF PBCASSE IN PBCASSE/PBS/PBCASSE DH STRUCTURE .....</b>	1367
<i>Seishi Abe, Masakazu Kuwabara, Hirofumi Kan, Katashi Masunoto</i>	
<b>MICRO-TWIN DEFECTS IN INSB/ALINSB LAYERS GROWN ON (001) GAAS ~ APPLICATION OF THE 116-DIRECTIONAL TEM ANALYSIS~ .....</b>	1373
<i>T. D. Mishima, M. B. Santos</i>	
<b>Author Index</b>	