

# SYMPOSIUM L

GaN and Related Alloys

December 2 – 6, 2002

## Chairs

Ed T. Yu Univ of CA, San Diego  
Yasuhiko Arakawa Univ of Tokyo  
Angela Rizzi Forschungszentrum Julich  
James S. Speck Univ of California-Santa Barbara  
Christian M. Wetzel Uniroyal Optoelectronics

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\* Invited paper

## SESSION L1: EPITAXY—DEVICES AND DEFECT REDUCTION

Chair: Russell D. Dupuis

Monday Morning, December 2, 2002  
Room 302 (Hynes)

### 8:30 AM \*L1.1

ISSUES FOR NITRIDE UV DEVICES. Hiroshi Amano, Shun Takanami, Yoshihito Tomida, Motoaki Iwaya, Shugo Nitta, Satoshi Kamiyama, Isamu Akasaki High-Tech Research Center, Meijo Univ., Tempaku-ku, Nagoya, JAPAN.

### 9:00 AM L1.2

LARGE-AREA, DEVICE QUALITY GaN ON Si USING A NOVEL TRANSITION LAYER SCHEME. Pradeep Rajagopal, Thomas Gehrke, John C. Roberts, T. Warren Weeks, Kevin J. Linthicum, Edwin L. Piner, Nitronex Corporation, Raleigh, NC.

### 9:15 AM L1.3

REDUCTION OF STRESS AND DISLOCATIONS AT THE INITIAL STAGES OF GaN GROWTH FOR THICK (>5  $\mu\text{m}$ ), CRACK-FREE GaN LAYERS ON Si(111). M. Poschenrieder, A. Dadgar, J. Blaesing, F. Bertram, A. Diez, J. Christen, and A. Krost, Otto-von-Guericke Universitaet Magdeburg, Magdeburg, GERMANY; O. Contreras and F.A. Ponce, Department of Physics and Astronomy, Arizona State University, Tempe, AZ.

### 9:30 AM L1.4

III-NITRIDE GROWTH ON LITHIUM NIOBATE: A NEW SUBSTRATE MATERIAL FOR POLARITY ENGINEERING IN III-NITRIDE HETEROEPITAXY. W. Alan Doolittle, Gon Namkoong, Alexander Carver and Walter Henderson, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA; April S. Brown, School of Electrical and Computer Engineering, Duke University, Durham, NC.

### 9:45 AM BREAK

### 10:15 AM L1.5

DISLOCATION MOBILITY AND YIELD STRENGTH OF BULK SINGLE-CRYSTAL GaN. Ichiro Yonenaga, Institute for Materials Research, Tohoku University, Sendai, JAPAN.

### 10:30 AM L1.6

SELF-SEEDING GROWTH OF ALUMINUM NITRIDE SINGLE CRYSTALS. B. Liu, D. Zhuang, and J.H. Edgar, Kansas State Univ, Dept of Chemical Engineering, Manhattan, KS.

### 10:45 AM L1.7

SUBLIMATION GROWTH OF BULK AlN CRYSTALS. Rafael Dalmáu, Raoul Schlessler, Zlatko Sitar, North Carolina State

University, Dept of Materials Science and Engineering, Raleigh, NC.

### 11:00 AM L1.8

CANTILEVER EPITAXY OF GaN ON SAPPHIRE: FURTHER REDUCTIONS IN DISLOCATION DENSITY. D.M. Follstaedt, P.P. Provencio, D.D. Koleske, C.C. Mitchell, A.A. Allerman, N.A. Missert and C.I.H. Ashby, Sandia National Laboratories, Albuquerque, NM.

### 11:15 AM L1.9

LATERAL GROWTH OF AlGaIn AND GaN ON SiC SUBSTRATES PATTERNED BY PHOTO-ELECTROCHEMICAL ETCHING. U. Rossow, N. Riedel, F. Hitzel, T. Riedl, and A. Hangleiter Institute of Technical Physics, Technical University of Braunschweig, GERMANY.

### 11:30 AM L1.10

MASS TRANSPORT AND KINETIC LIMITATIONS IN GaN EPITAXIAL LATERAL OVERGROWTH. Michael E. Coltrin and Christine C. Mitchell, Sandia National Laboratories, Albuquerque, NM.

### 11:45 AM L1.11

THE NATURE OF MAGNESIUM PRECIPITATION IN GaN AND AlGaIn DEPOSITED BY EPITAXIAL LATERAL OVERGROWTH. R. Liu, A. Bell, F.A. Ponce, D. Cherns<sup>a</sup>, H. Amano<sup>b</sup> and I. Akasaki<sup>b</sup>, Dept. Physics and Astronomy, Arizona State University, Tempe, AZ; <sup>a</sup>H.H. Wills Physics Laboratory, Bristol, UNITED KINGDOM; <sup>b</sup>Dept. Materials Science and Eng., Meijo University, Nagoya, JAPAN.

## SESSION L2: DEFECTS AND CHARACTERIZATION

Chair: Ed T. Yu

Monday Afternoon, December 2, 2002  
Room 302 (Hynes)

### 1:30 PM \*L2.1

FIRST-PRINCIPLES TOTAL ENERGY CALCULATIONS FOR NITRIDE MATERIALS: SURFACES AND DISLOCATIONS. John E. Northrup, Palo Alto Research Center, Palo Alto, CA.

### 2:00 PM L2.2

EVIDENCE FOR A NEW DISLOCATION TYPE IN GaN. L. Lymperakis, J. Neugebauer, Fritz-Haber-Institut, Berlin, GERMANY; T. Remmele, M. Albrecht, H.P. Strunk, Universität Erlangen, GERMANY.

### 2:15 PM L2.3

DETERMINATION OF THE ELECTRICAL CHARGE STATE OF THREADING DISLOCATIONS IN GALLIUM NITRIDE BY SCANNING SURFACE POTENTIAL MICROSCOPY. André Krtschil, Armin Dadgar, and Alois Krost, Institute of Experimental Physics, Otto-von-Guericke-University Magdeburg, Magdeburg, GERMANY.

### 2:30 PM L2.4

CORRELATED SCANNING KELVIN PROBE AND CONDUCTIVE ATOMIC FORCE MICROSCOPY STUDIES OF DISLOCATIONS IN GALLIUM NITRIDE. B.S. Simpkins, University of California, San Diego, Materials Science Program, San Diego, CA; E.T. Yu, University of California, San Diego, Dept of Electrical and Computer Engineering, San Diego, CA; P. Waltereit, University of California, Santa Barbara, Dept of Materials, Santa Barbara, CA; J.S. Speck, University of California, Santa Barbara, Dept of Materials, Santa Barbara, CA.

### 2:45 PM L2.5

THE CORE STRUCTURE OF DISLOCATIONS IN GALLIUM NITRIDE GROWN UNDER Ga-RICH AND Ga-LEAN CONDITIONS. Marcus Q. Baines, David Cherns, Bristol Univ, Dept of Physics, Bristol, UNITED KINGDOM; Julia W.P. Hsu, Michael J. Manfra, Bell Labs, Lucent Technologies, Murray Hill, NJ.

### 3:00 PM BREAK

### 3:30 PM \*L2.6

PROPERTIES AND PASSIVATION OF ELECTRONIC STATES AT FREE SURFACES AND SCHOTTKY INTERFACES OF GaN AND RELATED ALLOYS. Hideki Hasegawa and T. Hashizume, Research Center for Integrated Quantum Electronics (RCIQE) and Graduate School of Electronics and Information Engineering, Hokkaido University, Sapporo, JAPAN.

### 4:00 PM L2.7

ELECTRONIC STATES, MICROSTRUCTURE, AND SURFACE CHEMISTRY OF AMMONIA CLEANED GaN (0001). William J. Mecouch, T.E. Cook, P.J. Hartlieb, Z.J. Reitmeier, J.R. DiMaio, R.F. Davis, North Carolina State University, Dept of

Materials Science and Engineering, Raleigh, NC; R.J. Nemanich, North Carolina State University, Dept of Physics, Raleigh, NC.

**4:15 PM L2.8**

EFFECT OF UV ILLUMINATION AND BIAS STRESS ON SURFACE BARRIER IN AlGa<sub>N</sub>/Ga<sub>N</sub> HETEROSTRUCTURES. G. Koley, Ho-Young Cha, V. Tilak, L.F. Eastman and M.G. Spencer, Cornell University, Department of Electrical and Computer Engineering, Ithaca, NY.

**4:30 PM L2.9**

AN ATTEMPT TO CORRELATE MACROSCOPIC TRANSPORT PARAMETERS OF Ga<sub>N</sub> LAYERS TO THEIR LOCAL ELECTRICAL PROPERTIES IN SUBMICRON SCALE. H. Witte, A. Krtischil, E. Schrenk, K. Flügge, A. Dadgar, A. Krost, J. Christen, Otto-von-Guericke-Universität Magdeburg, Institute of Experimental Physics, Magdeburg, GERMANY.

**4:45 PM L2.10**

SPATIAL VARIATION OF TRANSCONDUCTANCE IN AlGa<sub>N</sub>/Ga<sub>N</sub> HETEROSTRUCTURES IMAGED BY SCANNING GATE MICROSCOPY. J.W.P. Hsu, N.G. Weimann, M.J. Manfra, K.W. West, Bell Labs, Lucent Technologies, Murray Hill, NJ; D.V. Lang, Agere Systems, Berkeley Heights, NJ; R.J. Molnar, MIT Lincoln Lab, Lexington, MA.

SESSION L3: POSTER SESSION  
Monday Evening, December 2, 2002  
8:00 PM  
Exhibition Hall D (Hynes)

**L3.1**

EARLY STAGES OF Ga<sub>N</sub> GROWTH ON AlN NUCLEATION LAYERS GROWN ON (0001) SAPPHIRE BY METALORGANIC CHEMICAL VAPOR DEPOSITION. Vijay Narayanan, IBM T.J. Watson Research Center, Yorktown Heights, NY; Mario Gonsalves, Wook Kim, Subhash Mahajan, Dept of Chemical and Materials Engineering, Arizona State University, Tempe, AZ.

**L3.2**

INFLUENCE OF PRESSURE ON THE GROWTH MECHANISM AT THE EARLY STAGES OF THE MOCVD GROWTH OF Ga<sub>N</sub> THIN FILMS. Seong-Woo Kim, Tomoki Shibata, Toshimasa Suzuki, Nippon Inst. of Technology, Saitama, JAPAN; Takashi Yamada, Kazuhiro Haga, Chichibu Fuji Co. Ltd, Saitama, JAPAN.

**L3.3**

INFLUENCE OF THE SAPPHIRE NITRIDATION CONDITIONS ON Ga<sub>N</sub> FILMS GROWN BY CYCLIC-PLD. P. Sanguino, M. Niehus, S.V. Koynov, L.V. Melo, R. Schwarz, Instituto Superior Técnico, Dept of Physics, Lisboa, PORTUGAL; T. Monteiro, M.J. Soares, Aveiro University, Dept of Physics, Aveiro, PORTUGAL; H. Alves, B.K. Meyer, Justus-Liebig University, Dept of Physics, Giessen, GERMANY.

**L3.4**

STUDY ON CHEMICAL TREATMENT AND HIGH TEMPERATURE NITRIDATION OF SAPPHIRE FOR III-NITRIDE HETEROEPITAXIAL GROWTH. F. Dwikusuma, T.F. Kuech, Department of Chemical Engineering, University of Wisconsin, Madison, WI; D. Saulys, Materials Research Science and Engineering Center, University of Wisconsin, Madison, WI.

**L3.5**

ION BEAM STUDY OF EARLY STAGES OF GROWTH OF Ga<sub>N</sub> FILMS ON SAPPHIRE. Eugen M. Trifan, David C. Ingram, Department of Physics and Astronomy, Ohio University, Athens, OH.

**L3.6**

REAL-TIME OPTICAL MONITORING OF GAS PHASE KINETICS IN In<sub>N</sub> VAPOR PHASE EPITAXY AT HIGH PRESSURE. Nikolaus Dietz, Vincent Woods, Georgia State University, Department of Physics, Atlanta, GA.

**L3.7**

LOW TEMPERATURE LASER-ASSISTED GAS PHASE REACTIVITY OF TMAI AND TMGa WITH NH<sub>3</sub> AND OXYGEN-CONTAINING COMPOUNDS (H<sub>2</sub>O, HO(CH<sub>3</sub>), O(CH<sub>3</sub>)<sub>2</sub>) IN CONSTRAINED PULSE EXPANSIONS. Alexander Demchuk, APA Optics, Inc, Blaine, MN; Michael Lynch, Steven Simpson and Brent Koplitz, Dept of Chemistry, Tulane University, New Orleans, LA.

**L3.8**

HIGH-MOBILITY Ga-POLARITY Ga<sub>N</sub> ACHIEVED BY NH<sub>3</sub>-MBE.

Junxi Wang, Xiaoliang Wang, Dianzhao Sun, Jinmin Li, Yiping Zeng, Guoxin Hu, Hongxin Liu, Lanying Lin, Institute of Semiconductors, Chinese Academy of Sciences, Beijing, P.R.CHINA.

**L3.9**

PHASE TRANSITIONS ON Ga<sub>N</sub> SURFACES. Christoph Adelman, Julien Brault, Guido Mula, Bruno Daudin, CEA-Grenoble, Equipe mixte CEA-CNRS-UJF Nanostructures et Semiconducteurs, Grenoble, FRANCE; Liverios Lymperakis, Joerg Neugebauer, Fritz-Haber-Institut, Berlin, GERMANY.

**L3.10**

NITROGEN GAS-CLUSTER ION BEAM-A NEW NITROGEN SOURCE FOR Ga<sub>N</sub> GROWTH. Y. Shao, D.B. Fenner, Epion Corporation of JDS Uniphase, Billerica, MA; T.C. Chen, T.D. Moustakas, Boston Univ, Dept. of Electrical & Computer Eng., Boston, MA.

**L3.11**

GROWTH OF THIN ORIENTED GALLIUM NITRIDE FILMS ON AMORPHOUS SUBSTRATES USING SELF ASSEMBLY. M.K. Sunkara and H. Li, Department of Chemical Engineering, University of Louisville, Louisville, KY.

**L3.12**

RAMAN MAPPING AND FINITE ELEMENT ANALYSIS OF EPITAXIAL LATERAL OVERGROWN Ga<sub>N</sub> ON SAPPHIRE SUBSTRATES. M. Benyoucef, M. Kuball, H.H. Wills Physics Laboratory, University of Bristol, Bristol, UNITED KINGDOM; B. Beaumont, V. Bousquet, P. Gibart, Centre de Recherches sur l'Heteroepitaxie et ses Applications (CRHEA-CNRS), Valbonne, FRANCE.

**L3.13**

STRAIN DISTRIBUTION IN EPITAXIAL LATERALLY-OVERGROWN Ga<sub>N</sub> ON HEXAGONAL MASK. Q.K.K. Liu, Theoretical Physics Div., Hahn-Meitner-Inst., Berlin, GERMANY; U. Habocek, A. Hoffmann, Inst. für Festkörperphysik, Technische Universität Berlin, Berlin, GERMANY; T. Riemann, J. Christen, Inst. für Experimentelle Physik, Otto-von-Guericke-Universität, Magdeburg, GERMANY; M. Seyboth, F. Habel, Abteilung Optoelektronik, Universität Ulm, Ulm, GERMANY.

**L3.14**

A CRYSTAL PLASTICITY MODEL FOR THE LATERAL EPITAXIAL OVERGROWTH OF Ga<sub>N</sub>. W.M. Ashmawi, M.A. Zikry, and T.S. Zheleva<sup>a</sup>, Department of Mechanical and Aerospace Engineering, North Carolina State University, Raleigh, NC; <sup>a</sup>Department of Material Science and Engineering, North Carolina State University, Raleigh, NC, and Army Research Lab, Adelphi, MD.

**L3.15**

COMPARISON OF LATERAL DEFECTS IN CANTILEVER EPITAXIAL Ga<sub>N</sub> ON SAPPHIRE. P.P. Provencio, D.M. Follstaedt, N.A. Missert, D.D. Koleske, C.C. Mitchell, A.A. Allerman, and C.I.H. Ashby, Sandia National Laboratories, Albuquerque, NM.

**L3.16**

InGa<sub>N</sub>/Ga<sub>N</sub> MULTIPLE QUANTUM WELL LEDS GROWN BY MOCVD USING CANTILEVER EPITAXY. A.J. Fischer, D.D. Koleske, A.A. Allerman, C.C. Mitchell, K.H.A. Bogart, R.J. Shul, J.J. Figiel, K.W. Fullmer, Sandia National Laboratories, Albuquerque, NM.

**L3.17**

STUDY OF THE ORIGIN OF MISORIENTATION IN Ga<sub>N</sub> GROWN BY PENDEO-EPITAXY. Dmitri N. Zakharov, Zuzanna Liliental-Weber, Lawrence Berkeley National Laboratory, Materials Sciences Division, Berkeley, CA; Sven Einfeldt, University of Bremen, Institute of Solid State Physics, Bremen, GERMANY; Robert F. Davis, North Carolina State University, Department of Materials Science and Engineering, Raleigh, NC.

**L3.18**

DISLOCATION REDUCTION IN HETEROEPITAXIAL NONPOLAR (11 $\bar{2}$ ) A-PLANE Ga<sub>N</sub> FILMS VIA LATERAL OVERGROWTH. Michael D. Craven, Sung-Hwan Lim, Feng Wu, James S. Speck, Steven P. DenBaars, Materials Department, University of California, Santa Barbara, CA.

**L3.19**

EFFECT OF GROWTH CONDITIONS ON THE NUCLEATION OF HIGH TEMPERATURE Ga<sub>N</sub> ISLANDS GROWN BY MOCVD ON {11 $\bar{2}$ } SAPPHIRE. Frederic Degave, Pierre Ruterana, Gerard Nouet, ISMRA CRISMAT ESCTM, Caen, FRANCE; D.D. Koleske, M.E. Twigg, R.L. Henry, A.E. Wickenden, Naval Research Lab, Washington, DC.

**L3.20**

STRUCTURAL CHARACTERIZATION OF GaN FILMS GROWN ALONG THE NON-POLAR [11-20] DIRECTION. David J. Smith, M.R. McCartney, Arizona State University, Center for Solid State Science, Tempe, AZ; S. Iyer, A. Battacharyya, K. Ludwig, T.D. Moustakas, Boston University, Department of Electrical Engineering, Boston, MA.

**L3.21**

EPITAXIAL GROWTH OF AlN ON 6H-SiC (11 $\bar{2}$ 0) BY MOLECULAR-BEAM EPITAXY. Norio Onojima, Jun Suda, Hiroyuki Matsunami, Kyoto Univ, Dept of Electronic Science and Engineering, Kyoto, JAPAN.

**L3.22**

GaN GROWN ON Si (111), Si (100) AND SOI SUBSTRATES. Junxi Wang, Xiaoliang Wang, Dianzhao Sun, Jinmin Li, Yiping Zeng, Hongxin Liu, Fengyi Huang, Lanying Lin, Institute of Semiconductors, Chinese Academy of Sciences, Beijing, P.R. CHINA.

**L3.23**

ELECTRICAL PROPERTIES OF GaN/Si GROWN BY MOCVD. Seikoh Yoshida, Jiang Li, Takahiro Wada and Hironari Takehara, Yokohama R&D Laboratories, The Furukawa Electric Co., Ltd, Nishi-ku, Yokohama, JAPAN.

**L3.24**

STUDIES ON EPITAXIAL RELATIONSHIP AND INTERFACE STRUCTURE OF AlN/Si(111) AND GaN/Si(111) HETEROSTRUCTURES. T. Rawdanowicz, H. Wang, A. Kvit, and J. Narayan, Department of Materials Science and Engineering, North Carolina State University, Raleigh, NC.

**L3.25**

CORRELATION BETWEEN THE AlN BUFFER LAYER THICKNESS AND THE GaN POLARITY IN GaN/AlN/Si(111) GROWN BY MBE. A.M. Sanchez, P. Ruterana, ESCM-CRISMAT, UMR6508-CNRS, ISMRA, Caen, FRANCE; S.I. Molina, F.J. Pacheco, R. Garcia, Dept de Ciencia de los Materiales e I. M. y Q. I., Universidad de Cadiz, Puerto Real, SPAIN; F. Calle, T.A. Palacios, M.A. Sanchez-Garcia, E. Calleja, Dept de Ingenieria Electronica, ETSI Telecomunicacion, UPM, Madrid, SPAIN.

**L3.26**

SINGLE CRYSTALLINE InN FILMS GROWN ON Si SUBSTRATES BY USING A BRIEF SUBSTRATE NITRIDATION PROCESS. Tomohiro Yamaguchi, Kazuhiro Mizuo, Yoshiki Saito, Takuma Noguchi, Tsutomu Araki, Yasushi Nanishi, Ritsumeikan Univ, Dept of Photonics, Shiga, JAPAN.

**L3.27**

STUDY ON CUBIC GaN GROWTH ON (001) RUTILE TiO<sub>2</sub> SUBSTRATES BY ECR-MBE. Tsutomu Araki, Hisashi Mamiya, Ken Kitamura, Yasushi Nanishi, Faculty of Science and Engineering, Ritsumeikan Univ., Shiga, JAPAN.

**L3.28**

CHARACTERIZATION OF CUBIC GaN FILMS USING AlN/GaN ORDERED ALLOY ON THE GaAs(100) BY RF-MBE. Junichi Shike, Atsushi Shigemori, Ryuhei Kimura, Koichi Ishida, Kiyoshi Takahashi, High-Tech Research Center, Faculty of Science and Engineering Teikyo University of Science and Technology, Uenohara, Kitatsuru-gun, Yamanashi, JAPAN.

**L3.29**

CONTROL OF THE 2D-3D TRANSITION FOR THE GROWTH OF CUBIC GaN/AlN NANOSTRUCTURES. Esteban Martinez-Guerrero, Christoph Adelman, Bruno Daudin, Jean-Luc Rouviere, Henri Mariette, CEA/CNRS group Nanophysique et Semiconducteurs, CEA Grenoble, FRANCE.

**L3.30**

COMPRESSIVE AND TENSILE INTRINSIC STRESS EVOLUTION IN ALUMINUM NITRIDE FILMS. A. Rajamani, S. Hong, R. Beresford, A. Bhandari, E. Chason, B.W. Sheldon, Brown University, Division of Engineering, Providence, RI.

**L3.31**

ALUMINUM NITRIDE GROWTH BY HALIDE VAPOR TRANSPORT EPITAXY. Vladimir Tashev, David Bliss, John Bailey, David Weyburne, Air Force Research Laboratory, Hanscom AFB, MA.

**L3.32**

AlN BULK CRYSTAL GROWTH BY SUBLIMATION SANDWICH METHOD. E.N. Mokhov, A.D. Roenkov, Yu.A. Vodakov, Crystal Growth Science and Technology Lab, St. Petersburg, RUSSIA; Yu.N.

Makarov, Semiconductor Technology Research Inc, Richmond, VA; H. Helava, The Fox Group Inc, Livermore, CA.

**L3.33**

EXPERIMENTAL AND THEORETICAL ANALYSIS OF HEAT AND MASS TRANSPORT IN THE SYSTEM FOR AlN BULK CRYSTAL GROWTH. M.V. Bogdanov, S.Yu. Karpov, A.V. Kulik, M.S. Ramm, Yu.N. Makarov, Semiconductor Technology Research Inc, Richmond, VA; R. Schlessler, Z. Sitar, NC State Univ, Mat. Sci. Eng. Dept, Raleigh, NC.

**L3.34**

THE INFLUENCE OF SUBSTRATE SURFACE POLARITY ON OPTICAL PROPERTIES OF GaN GROWN ON SINGLE CRYSTAL BULK AlN. G. Tamulaitis, I. Yilmaz, M.S. Shur, Rensselaer Polytechnic Institute, Dept of ECE and CIE, Troy, NY; R. Gaska, Sensor Electronic Technology, Inc., Latham, NY; C. Chen, J. Yang, E. Kuokstis, A. Khan, Univ of South Carolina, Dept of EE, Columbia, SC; C. Rojo, L. Schowalter, Crystal IS, Inc., Latham, NY.

**L3.35**

LOW PRESSURE GROWTH OF BULK GaN FROM GALLIUM/INDIUM ALLOYS. Challa Bekele, Kathleen Kash, John C. Angus, Cliff C. Hayman, Case Western Reserve Univ, Cleveland, OH.

**L3.36**

OPTICAL CHARACTERIZATION OF BULK GaN GROWN FROM A Na FLUX. B.J. Skromme, K. Palle, Dept of Electrical Engineering and Center for Solid State Electronics Research, Arizona State University, Tempe, AZ; C.D. Poweleit, Dept of Physics and Astronomy, Arizona State University, Tempe, AZ; H. Yamane, M. Aoki, Institute for Advanced Materials Processing, Tohoku University, JAPAN; F.J. DiSalvo, Dept of Chemistry and Chemical Biology, Cornell University, Ithaca, NY.

**L3.37**

THE IMPACT OF GROWTH CONDITIONS ON THE BACKGROUND IMPURITY CONCENTRATION OF GALLIUM NITRIDE WAFERS. Robert P. Vaudo, Xueping Xu, Edward L. Hutchins, Allan D. Salant, George R. Brandes, ATMI, Inc., Danbury, CT.

**L3.38**

LOW-ELECTRON-ENERGY CATHODOLUMINESCENCE STUDY OF POLISHING AND ETCHING EFFECTS ON THE OPTICAL PROPERTIES OF BULK SINGLE-CRYSTAL GALLIUM NITRIDE. Lawrence H. Robins, National Institute of Standards and Technology, Gaithersburg, MD; Bruce Steiner, National Institute of Standards and Technology, Gaithersburg, MD (retired); Norman A. Sanford, National Institute of Standards and Technology, Boulder, CO; Carmen Menoni, Colorado State University, Fort Collins, CO.

**L3.39**

PRODUCTION OF SAPPHIRE BLANKS AND SUBSTRATES FOR BLUE LEDs AND LDs. Chandra P. Khattak, Frederick Schmid, Paul J. Guggenheim, Maynard B. Smith, Henry H. Rogers, and Kurt Schmid, Crystal Systems Inc., Salem, MA.

**L3.40**

TRANSPORT AND CHEMICAL MECHANISMS IN GaN HALIDE VAPOR PHASE EPITAXY. S.Yu. Karpov, A.S. Segal, D.V. Zimina, S.M. Smirnov, A.P. Sid'ko, Soft-Impact Ltd, St. Petersburg, RUSSIA; Yu.N. Makarov, STR Inc, Richmond, VA; D. Martin, V. Wagner, M. Ilegems, Institute for Quantum Electronics and Photonics, Swiss Federal Institute of Technology, Lausanne, SWITZERLAND.

**L3.41**

LATTICE CONSTANTS VARIATION IN THE GaN:Si SINGLE LAYERS GROWN BY HVPE. A.S. Usikov, G. Gainer, O.V. Kovalenkov, M. Mastro, A.I. Pechnikov, D.V. Tsvetkov, V.A. Soukhoveev, Y.V. Shapovalova, Technologies and Devices International, Silver Spring, MD.

**L3.42**

TEMPERATURE AND EXCITATION POWER DEPENDENCE OF THE LUMINESCENCE DECAY IN FREE-STANDING HVPE GaN. Qing Yang, Henning Feick, and Eicke R. Weber, Department of Materials Science and Engineering, University of California, Berkeley, CA.

**L3.43**

OPTICAL PROPERTIES OF GaN THICK FILMS GROWN BY NOVEL HYDRIDE VAPOR PHASE EPITAXY. Minseo Park, J.J. Cuomo, Department of Materials Science and Engineering, North Carolina State University, Raleigh, NC; Y.C. Chang, A.L. Cai, J.F. Muth, R.M. Kolbas, Department of Electrical and Computer Engineering, North Carolina State University, Raleigh, NC; R.J.

Nemanich, Department of Physics, North Carolina State University, Raleigh, NC; A. Hanser, J. Bumgarner, Kyma Technologies, Inc., Raleigh, NC.

#### **L3.44**

ANALYSIS OF  $\langle 0001 \rangle$  TILT GRAIN BOUNDARIES IN GaN AT THE ATOMIC SCALE. Jun Chen, Inst Univ de Technologie, Lab Univ de Recherche Scientifique d'Alencor, Damigny, FRANCE; Gerard Nouet, Pierre Ruterana, ISMRA CRISMAT ESCTM, Caen FRANCE.

#### **L3.45**

COMPARISON OF DISLOCATION DENSITY MEASUREMENT TECHNIQUES FOR GaN. Y.S. Choi, B.T. Lee, Photonic and Electronic Thin Film Laboratory, Department of Materials Science and Engineering, Chonnam National University, Gwang-ju, KOREA.

#### **L3.46**

MICROCATHODOLUMINESCENCE AND ELECTRON BEAM INDUCED CURRENT OBSERVATION OF DISLOCATIONS IN FREESTANDING THICK n-GaN SAMPLE GROWN BY HYDRIDE VAPOR PHASE EPITAXY. A.Y. Polyakov, A.V. Govorkov, N.B. Smirnov, Institute of Rare Metals, Moscow, RUSSIA; Z-Q. Fang, D.C. Look, Wright State Univ, Semiconductor Research Center, Dayton, OH; S.S. Park, J.H. Han, Samsung Advanced Institute of Technology, Suwon, KOREA.

#### **L3.47**

TEM ANALYSIS OF STRESS RELIEF MECHANISM ASSOCIATED WITH THREADING DISLOCATIONS IN GaN/AlGaIn/GaN. N. Kuwano, Kyushu Univ, KASTEC, Kasuga, JAPAN; T. Tsuruda, Kyushu Univ, Dept of Adv Sci for Electronic & Mater, Kasuga, JAPAN; S. Terao, S. Kamiyama, H. Amano and I. Akasaki, Meijo Univ, Dept of M.S.E., Nagoya, JAPAN.

#### **L3.48**

SCREW DISLOCATIONS IN MBE GaN LAYERS GROWN ON TOP OF HVPE LAYERS; ARE THEY DIFFERENT? Z. Liliental-Weber, J. Jasinski, D. Zakharov, and J. Washburn, Materials Science Division, Lawrence Berkeley National Laboratory, Berkeley CA; M. O'Keefe, National Center for Electron Microscopy, Berkeley, CA; H. Morkoc, Virginia Commonwealth University, Richmond, VA.

#### **L3.49**

PIEZORESPONSE FORCE MICROSCOPY OF INVERSION DOMAINS IN AlN/Si. B.J. Rodriguez, A. Gruverman, A.I. Kingon, R.J. Nemanich, North Carolina State University, Department of Physics and Department of Materials Science and Engineering, Raleigh, NC.

#### **L3.50**

PHOTOREFLECTANCE SPECTROSCOPY OF Al/GaN/GaN HEMT STRUCTURES. D.K. Gaskill, O.J. Glembocki, B. Peres<sup>a</sup>, and R. Henry, Naval Research Laboratory, Washington DC; <sup>a</sup>EMCORE, Somerset, NJ.

#### **L3.51**

COMPOSITIONAL FLUCTUATIONS IN Al<sub>x</sub>Ga<sub>1-x</sub>N BUFFER LAYERS GROWN ON 6H-SiC BY MOVPE. R. Kröger, P. Ryder, S. Einfeldt, Inst of Solid State Physics, University of Bremen, Bremen, GERMANY; R.F. Davis, Dept of Materials Science and Engineering, North Carolina State University, Raleigh, NC.

#### **L3.52**

HIGH SPATIAL RESOLUTION CATHODOLUMINESCENCE MEASUREMENT OF InGaIn. Hisashi Kanie, Hiroaki Okado, Kenya Yoshimura, Dept of Applied Electronics, Tokyo Univ of Science, Chiba, JAPAN.

#### **L3.53**

LOCAL PROPERTIES OF AlN: A COMPUTATIONAL APPROACH. J.M. Vail, Q.C. Qiu and Y. Xu, University of Manitoba, Department of Physics and Astronomy, Winnipeg, MB, CANADA; R. Pandey, H. Jiang, A. Costales and M.A. Blanco, Michigan Technological University, Department of Physics, Houghton, MI.

#### **L3.54**

SURFACE TREATMENTS OF GaN STUDIED WITH AFM AND PES. S.M. Widstrand, K.O. Magnusson, E. Moons, L.S.O. Johansson, J.B. Gustafsson, M. Gurnett, Dept. of Physics, Karlstad Univ, Karlstad, SWEDEN; M.I. Larsson, Dept. of Material Sci. and Eng., Stanford Univ, Stanford, CA; H.W. Yeom, Dept of Physics, Yonsei Univ, Seoul, KOREA; H. Miki, Chowa Denko, Chichibu, Saitama, JAPAN; M. Oshima, Dept of Applied Chemistry, Univ of Tokyo, Tokyo, JAPAN.

#### **L3.55**

COMPARISONS OF GALLIUM NITRIDE AND INDIUM NITRIDE PROPERTIES AFTER CF<sub>4</sub> / ARGON REACTIVE ION ETCHING. Marie Wintrebert-Fouquet, K. Scott A. Butcher, Trevor L. Tansley, Physics Department, Macquarie University, Sydney, AUSTRALIA; Simon K.H. Lam, CSIRO Telecommunications and Industrial Physics, Lindfield, AUSTRALIA.

#### **L3.56**

PHOTOREFLECTANCE CHARACTERIZATION AND CONTROL OF DEFECTS IN GaN BY ETCHING WITH AN INDUCTIVELY COUPLED PLASMA. O.J. Glembocki, D.K. Gaskill, S.M. Prokes, Naval Research Laboratory, Washington, DC; and S.W. Pearton, Department of Material Science and Engineering, University of Florida, Gainesville, FL.

#### **L3.57**

ELECTROREFLECTANCE AND PHOTOREFLECTANCE STUDIES OF ELECTRIC FIELDS IN Pt/GaN SCHOTTKY DIODES AND AlGaIn/GaN HETEROSTRUCTURES. S. Shokhovets, G. Goldhahn, G. Gobsch, Ilmenau Technical Univ, Inst of Physics, Ilmenau, GERMANY; O. Ambacher, Ilmenau Technical Univ, Center for Micro- and Nanotechnologies, Ilmenau, GERMANY; I.P. Smorchkova, J.S. Speck, U. Mishra, Univ of California, Electrical and Computer Engineering Dept and Materials Dept, Santa Barbara, CA; A. Link, M. Hermann, M. Eickhoff, Technical Univ Munich, Walter Schottky Inst, Garching, GERMANY.

#### **L3.58**

INVESTIGATION OF INTERFACE DEFECT STATE DENSITY AND BAND OFFSET OF GaN-Ga<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub> AND GaN-Si<sub>3</sub>N<sub>4</sub> SYSTEMS AFTER LOW TEMPERATURE N<sub>2</sub>/He PLASMA-ASSISTED SURFACE CLEANING. C. Bae and G. Lucovsky, Dept of Physics, Materials Science and Engineering and Electrical and Computer Engineering, North Carolina State Univ, Raleigh, NC.

#### **L3.59**

BAND OFFSET MEASUREMENTS OF Si<sub>3</sub>N<sub>4</sub> ON CLEAN N-TYPE GaN. Ted E. Cook Jr., C.C. Fulton, W.J. Mecouch, R.F. Davis, G. Lucovsky, and R.J. Nemanich, Dept. of Materials Science and Engineering and Dept. of Physics, North Carolina State University, Raleigh, NC.

#### **L3.60**

EFFECTS OF PLASMA CONDITIONS ON STRUCTURAL AND ELECTRICAL BEHAVIOR OF MAGNESIUM OXIDE GATE DIELECTRICS GROWN BY GSMBE ON GALLIUM NITRIDE. A.H. Onstine, B.P. Gila, C.R. Abernathy, S.J. Pearton, University of Florida, Dept of Materials Science and Engineering, Gainesville, FL; J. Kim, F. Ren, University of Florida, Dept of Chemical Engineering, Gainesville, FL.

### SESSION L4: EPITAXY—NONPOLAR ORIENTATIONS AND ALLOYS

Chair: James S. Speck

Tuesday Morning, December 3, 2002

Room 302 (Hynes)

#### **8:30 AM L4.1**

MORPHOLOGY AND SURFACE RECONSTRUCTIONS OF M-PLANE GaN. C.D. Lee and R.M. Feenstra, Dept. Physics, Carnegie Mellon University, Pittsburgh, PA; J.E. Northrup, Palo Alto Research Center, Palo Alto, CA; L. Lymerakis and J. Neugebauer, Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, GERMANY.

#### **8:45 AM L4.2**

GaN EPILAYERS AND AlGaIn/GaN MULTIPLE QUANTUM WELLS ON FREE-STANDING (1 $\bar{1}00$ ) ORIENTED GaN SUBSTRATES. C.Q. Chen, M.E. Gaevski, W.H. Sun, E. Kuokstis, J.W. Yang, G. Simin, M.A. Khan, Department of Electrical Engineering, University of South Carolina, Columbia, SC; Herbert-Paul Maruska, David W. Hill, Mitch M.C. Chou, Bruce Chai, Crystal Photonics, Inc., Sanford, FL.

#### **9:00 AM L4.3**

CHARACTERIZATION OF NONPOLAR (11 $\bar{2}0$ ) a-PLANE AlGaIn/GaN AND InGaIn/(In)GaIn QUANTUM STRUCTURES. Michael D. Craven, Tal Margalith, Stacia Keller, Patrick Walther, Feng Wu, James S. Speck, Steven P. DenBaars, Materials Department, University of California, Santa Barbara, CA.

#### **9:15 AM L4.4**

A COMPARATIVE STUDY OF GROWTH AND LUMINESCENCE PROPERTIES OF InGaAlN ALLOYS AND GaIn/InGaAlN MQWS

GROWN BY MBE ON M-PLANE GaN SUBSTRATES (NON-POLAR) AND C-PLANE GaN QUASI-SUBSTRATES (POLAR). A. Bhattacharyya, J. Cabalu, Tai-Chou Chen, Y. Fedyunin, T.D. Moustakas, Boston University, Department of Electrical Engineering, Boston, MA; I. Friel, Boston University, Physics Department, Boston, MA; H.-P. Maruska, D.W. Hill, J.J. Gallagher, M.M. Chou, B. Chai, Crystal Photonics Inc., Sanford, FL.

**9:30 AM L4.5**

GROWTH OF QUATERNARY AlInGaN/GaN HETEROSTRUCTURES BY PLASMA-ASSISTED MBE. Eva Monroy, Edith Bellet-Amalric, Yuji Hori, Denis Jalabert, Noelle Gogneau, Fabrice Enjalbert, Le Si Dang, Bruno Daudin, CEA-Grenoble, Equipe mixte CEA-CNRS-UJF Nanostructures et Semiconducteurs, FRANCE.

**9:45 AM BREAK**

**10:15 AM L4.6**

LATTICE RELAXATION OF AlN BUFFER ON SURFACE-TREATED SiC IN MOLECULAR-BEAM EPITAXY FOR GROWTH OF HIGH-QUALITY GaN. Jun Suda, Kouhei Miura, Misako Honaga, Norio Onojima, Yusuke Nishi, Hiroyuki Matsunami, Kyoto Univ, Dept of Electronic Science and Engineering, Kyoto, JAPAN.

**10:30 AM L4.7**

EFFECTS OF LOW-TEMPERATURE AlN BUFFER-LAYER AND STRAIN-LAYER SUPERLATTICE ON DENSITY OF THREADING DISLOCATIONS IN AlGaIn LAYERS. H. Meidia, D.-W. Kim, S. Mahajan, Arizona State University, Dept of Chemical and Materials Engineering, Tempe, AZ; C.Q. Chen, J.P. Zhang, J.W. Yang, M.A. Khan, University of South Carolina, Dept of Electrical Engineering, Columbia, SC.

**10:45 AM L4.8**

KINETICS OF THE GROWTH OF GALLIUM NITRIDE BY METALORGANIC MOLECULAR BEAM EPITAXY. Isaiah Steinke, Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN; Phil Cohen, Department of Electrical and Computer Engineering, University of Minnesota, Minneapolis, MN.

**11:00 AM L4.9**

ULTRAHIGH-QUALITY AlN EPILAYERS OVER SAPPHIRE WITH ROOM TEMPERATURE BAND-EDGE PHOTOLUMINESCENCE AT 208 NM. Jianping Zhang, H.-M. Wang, E. Kuokstis, Q. Fareed, W.H. Sun and M. Asif Khan, Department of Electrical Engineering, University of South Carolina, Columbia, SC.

**11:15 AM L4.10**

GROWTH OF THICK InN BY MOLECULAR BEAM EPITAXY. Hai Lu, William J. Schaff, Lester F. Eastman, Dept. of Electrical and Computer Engineering, Cornell University, Ithaca, NY; David C. Look, Semiconductor Research Center, Wright State University, Dayton, OH; J. Wu, Wladek Walukiewicz, Lawrence Berkeley National Laboratory, Berkeley, CA; Richard J. Molnar, MIT Lincoln Laboratory, Lexington, MA.

**11:30 AM L4.11**

GROWTH AND APPLICATIONS OF SiCAlN ON Si(111) VIA A CRYSTALLINE OXIDE INTERFACE. John Tolle, Radek Roucka, P.A. Crozier, A.V.G. Chizmeshya, I.S.T. Tsong and J. Kouvetakis, Arizona State University, Tempe, AZ.

**11:45 AM L4.12**

X-RAY DIFFRACTION AND RAMAN STUDY OF HIGH QUALITY GaN PRODUCED BY ULTRA HIGH RATE MAGNETRON SPUTTER EPITAXY. Minseo Park, J.-P. Maria, J.J. Cuomo, Department of Materials Science and Engineering, North Carolina State University, Raleigh, NC; Y.C. Chang, J.F. Muth, R.M. Kolbas, Department of Electrical and Computer Engineering, North Carolina State University, Raleigh, NC; R.J. Nemanich, Department of Physics, North Carolina State University, Raleigh, NC; E. Carlson, J. Bumgarner, Kyma Technologies, Inc., Raleigh, NC.

**SESSION L5: OPTICAL PROPERTIES**

Chair: Steve A. Stockman

Tuesday Afternoon, December 3, 2002  
Room 302 (Hynes)

**1:30 PM \*L5.1**

GaN/AlGaIn HETEROSTRUCTURES FOR OPTOELECTRONICS DEVICES BASED ON INTERSUBBAND TRANSITIONS. Claire Gmachl, Hock M. Ng, Jörg D. Heber, and Alfred Y. Cho, Bell Laboratories, Lucent Technologies, Murray Hill, NJ; S.N. George Chu,

Agere Systems, Murray Hill, NJ.

**2:00 PM L5.2**

OPTICAL PROPERTIES OF ORDERED AlGaIn. Martin Albrecht, M. Benamara, H.P. Strunk, Universität Erlangen Nürnberg, Institut für Werkstoffwissenschaften, Lehrstuhl Mikrocharakterisierung, Erlangen, GERMANY; L. Kirste, D.G. Ebling, K.W. Benz, Freiburger, Materialforschungszentrum, Universität Freiburg, Freiburg, GERMANY; I. Grzegory, S. Porowski, Polish Academy of Sciences, High Pressure Research Centre, Warsaw, POLAND; A. Kaschner, A. Hoffmann, Institut für Festkörperphysik, Technische Universität Berlin, Berlin, GERMANY.

**2:15 PM L5.3**

ROLE OF POLARIZATION IN THE PHOTOLUMINESCENCE OF C- AND M-PLANE ORIENTED GaN/AlGaIn MULTIPLE QUANTUM WELLS. Edmundas Kuokstis, Changqing Chen, Mikhail Gaevski, Wenhong Sun, Jinwei Yang, Grigory Simin, and M. Asif Khan, Univ of South Carolina, Dept of Electrical Engineering, Columbia, SC; Herbert-Paul Maruska, David W. Hill, Mitch M.C. Chou, Bruce Chai, Crystal Photonics, Inc., Sanford, FL.

**2:30 PM L5.4**

CATHODOLUMINESCENCE OF MBE-GROWN CUBIC AlGaIn/GaN MULTI QUANTUM WELLS ON GaAs (001) SUBSTRATE. D.J. As, S. Potthast, U. Köhler, A. Khartchenko and K. Lischka, Universität Paderborn, FB-6 Physik, Paderborn, GERMANY.

**2:45 PM BREAK**

**3:15 PM L5.5**

MICROSCOPIC DESCRIPTION OF RADIATIVE RECOMBINATIONS IN InGaIn/GaN QUANTUM SYSTEMS. Aurelien Morel, Pierre Lefebvre, Thierry Taliercio, Bernard Gil, Groupe d'Etude des Semiconducteurs, CNRS, Universite of Montpellier, FRANCE.

**3:30 PM L5.6**

DIRECT EVIDENCE FOR SUPPRESSED CARRIER RELAXATION IN InGaIn NANODOMAINS. I.L. Krestnikov, M. Strassburg, N.N. Ledentsov, A. Hoffmann, A. Strittmatter, D. Bimberg, Technische Universität Berlin, Institut für Festkörperphysik, Berlin, GERMANY; F. Bertram, J. Christen, Magdeburg Universität, Institut für Experimentelle Physik, Magdeburg, GERMANY.

**3:45 PM L5.7**

TIME-RESOLVED STUDIES OF CARRIER DYNAMICS IN NITRIDE SEMICONDUCTORS GROWN HOMOEPITAXIALLY BY MBE ON GaN TEMPLATES. M. Wraback, A.V. Sampath, H. Shen, G.A. Garrett, F. Semendy, and K. Aliberti, U.S. Army Research Laboratory, Sensors and Electron Devices Directorate, Adelphi, MD; T.D. Moustakas, ECE Department, Boston University, Boston, MA.

**4:00 PM L5.8**

DEEP DONOR ACCEPTOR PAIR LUMINESCENCE IN CO-DOPED GaN. Bing Han, Joel M. Gregie, Bruce W. Wessels, Northwestern Univ, Dept of Materials Science and Engineering and Materials Research Center, Evanston, IL; Melville P. Ulmer, Northwestern Univ, Dept of Physics and Astronomy, Evanston, IL.

**4:15 PM L5.9**

DIELECTRIC FUNCTION OF 'NARROW' BAND GAP InN. S. Shokhovets, G. Goldhahn, Ilmenau Technical Univ, Inst of Physics, Ilmenau, GERMANY; V. Cimalla, L. Spiess, G. Ecke, O. Ambacher, Ilmenau Technical Univ, Center for Micro- and Nanotechnologies, Ilmenau, GERMANY; J. Furtmueller, F. Bechstedt, Fridrich Schiller Univ, Inst of Solid State Theory and Theoretical Optics, Jena, GERMANY; H. Lu, W.J. Schaff, Cornell Univ, Dept of Electrical and Computer Engineering, Ithaca, NY.

**4:30 PM L5.10**

DETERMINATION OF THE REAL AND IMAGINARY OPTICAL CONSTANTS OF AlGaIn ALLOY FILMS BY SPECTROSCOPIC TRANSMITTANCE AND REFLECTANCE CORRELATED WITH PRISM-COUPLED WAVEGUIDE MODE MEASUREMENTS.

Lawrence H. Robins, Albert V. Davydov, Alexander J. Shapiro, National Institute of Standards and Technology, Gaithersburg, MD; Norman A. Sanford, National Institute of Standards and Technology, Boulder, CO; Denis V. Tsvetkov, Vladimir A. Dmitriev, Technologies and Devices International Inc., Silver Spring, MD; Stacia Keller, Umesh K. Mishra, Steven P. DenBaars, University of California, Santa Barbara, CA.

**4:45 PM L5.11**

AlN EPILAYERS WITH HIGH OPTICAL QUALITIES - EPITAXIAL GROWTH, PROPERTIES OF BAND-EDGE

EMISSIONS, AND APPLICATIONS. J. Li, K.B. Nam, M.L. Nakrmi, J.Y. Lin, and H.X. Jiang, Department of Physics, Kansas State University, Manhattan, KS.

SESSION L6: POSTER SESSION  
Tuesday Evening, December 3, 2002  
8:00 PM  
Exhibition Hall D (Hynes)

#### **L6.1**

IN AS A SURFACTANT FOR THE GROWTH OF AlGaN/GaN HETEROSTRUCTURES BY PLASMA ASSISTED MBE. Eva Monroy, Bruno Daudin, Noelle Gogneau, Edith Bellet-Amalric, Fabrice Enjalbert, Le Si Dang, Denis Jalabert, Julien Brault, CEA-Grenoble, Equipe mixte CEA-CNRS-UJF Nanostructures et Semiconducteurs, FRANCE.

#### **L6.2**

MOLECULAR BEAM EPITAXIAL GROWTH OF AlN/GaN MULTIPLE QUANTUM WELLS. Hong Wu, William J. Schaff, Cornell University, School of Electrical and Computer Engineering, Ithaca, NY; Madalina Furis, A.N. Cartwright, State University of New York at Buffalo, Department of Electrical Engineering, Buffalo, NY; Walter Henderson, W. Alan Doolittle, Georgia Institute of Technology, School of Electrical and Computer Engineering, Atlanta, GA; A.V. Osinsky, Corning Inc., Science and Technology, Corning, NY.

#### **L6.3**

EVOLUTION OF SUBGRAIN BOUNDARIES IN HETEROEPITAXIAL GaN/AlN/6H-SiC GROWN BY METALORGANIC CHEMICAL VAPOR DEPOSITION. B.J. Skromme, H.X. Liu, M.K. Mikhov, G.N. Ali, and K.C. Palle, Dept of Electrical Engineering and Center for Solid State Electronics Research, Arizona State Univ, Tempe, AZ; Z. Reitmeyer and R.F. Davis, Dept of Materials Science and Engineering, North Carolina State University, Raleigh, NC.

#### **L6.4**

VERTICAL COMPOSITION MODULATIONS IN AlGaN EPITAXIAL LAYERS. A.N. Westmeyer, S. Mahajan, Dept. of Chemical and Materials Engineering, Arizona State University, Tempe, AZ; D.D. Koleske, A.A. Allerman, R.M. Biefeld, Sandia National Laboratories, Albuquerque, NM.

#### **L6.5**

SEGREGATION EFFECTS AND BANDGAP ENGINEERING IN InGaN QUANTUM WELL HETEROSTRUCTURES. Sergey Karpov, Roman Talalae, Igor Evstratov, Kirill Bulashevich, Soft-Impact Ltd., St.-Petersburg, RUSSIA; Yuri Makarov, STR Inc., Richmond, VA.

#### **L6.6**

INDIUM DISTRIBUTION INSIDE QUANTUM WELLS: THE EFFECT OF GROWTH INTERRUPTION IN MBE AND MOCVD. A.M. Sanchez, P. Ruterana, ESCTM-CRISMAT, UMR6508-CNRS, ISMRA, Caen, FRANCE; S. Kret, Institute of Physics, PAS, Warsaw, POLAND; P. Dluzewski, G. Jurczak, CMSG IFTR PAS, Warsaw, POLAND; N. Grandjean, B. Damilano, P. De Mierry, J. Massies, Z. Bougrioua, P. Gibart, CRHEA, UPR 10 CNRS, Valbonne, FRANCE.

#### **L6.7**

DEPTH PROFILING InGaN/GaN MULTIPLE QUANTUM WELLS BY RUTHERFORD BACKSCATTERING: THE ROLE OF In/Ga INTERMIXING. S. Pereira and E. Pereira, Departamento de Física, Universidade de Aveiro, PORTUGAL; E. Alves and N.P. Barradas, Instituto Tecnológico e Nuclear, Sacavem, PORTUGAL; K.P. O'Donnell, Department of Physics, University of Strathclyde, Glasgow, UNITED KINGDOM; C. Liu, C.J. Deatcher, I.M. Watson, Institute of Photonics, University of Strathclyde, Glasgow, UNITED KINGDOM.

#### **L6.8**

LATTICE VIBRATIONS STUDIES OF WURTZITE  $In_xGa_{1-x}N$  FILMS BY COMBINING STRUCTURAL AND OPTICAL CHARACTERIZATION TECHNIQUES. M.R. Correia, S. Pereira, E. Pereira, Universidade de Aveiro, Dept. Física, Aveiro, PORTUGAL; A. Kasic, M. Schubert, University of Leipzig, Institute for Experimental Physics II, Leipzig, GERMANY; J. Frandon, M.A. Renucci, Laboratoire de Physique des Solides, CNRS-UMR 5477, Université Paul Sabatier, Toulouse, FRANCE; E. Alves, D. Sequeira and N. Franco, Instituto Tecnológico e Nuclear, Dep. Física, Sacavém, PORTUGAL.

#### **L6.9**

NEARLY-ZERO FIELD QUATERNARY InAlGaN/GaN QUANTUM WELLS GROWN BY RF-MBE. N.T. Pelekanos, M. Androulidaki, E.

Dimakis, F. Kalaitzakis, E. Aperathitis, K. Tsagaraki, A. Georgakilas, FORTH, Heraklion, GREECE; E. Bellet-Amalric, D. Jalabert, CEA, Grenoble, FRANCE.

#### **L6.10**

SINGLE-PHASE EPITAXIAL WURTZITE  $Al_{1-x}In_xN$  ( $0.35 < x < 0.52$ ) THIN FILMS. Timo Seppänen, Sukkaneste Tungasmita, György Radnóczy, Lars Hultman, Jens Birch, Linköping University, Dept of Physics and Measurement Technology, Linköping, SWEDEN.

#### **L6.11**

THERMOELECTRIC PROPERTIES OF AlInN AND AlGaInN GROWN BY REACTIVE RF-SPUTTERING: TARGETTING A THERMOPOWER DEVICE. Shigeo Yamaguchi<sup>a,b</sup>, Yasuo Iwamura<sup>a,b</sup>, Atsushi Yamamoto<sup>b</sup>; <sup>a</sup>Kanagawa University, Dept. of Electrical, Electronic and Information Engineering, Yokohama, JAPAN; <sup>b</sup>National Institute of Advanced Industrial Science and Technology, Energy Electronics Institute, Tsukuba, JAPAN.

#### **L6.12**

X-RAY DIFFRACTION ANALYSIS OF GaN, AlN, AlGaIN AND InGaAlN. H. Kang, Z.C. Feng, and Ian Ferguson, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA; S.P. Guo, M. Pophristic, and B. Peres, EMCORE Corporation, Somerset, NJ.

#### **L6.13**

RARE EARTH DOPED GaN LUMINESCENT FILMS GROWN BY MOCVD. M. Pan, A.J. Steckl, University of Cincinnati, Dept of ECECS, Nanoelectronics Laboratory, Cincinnati, OH.

#### **L6.14**

PHOTOPUMP-ENHANCED EMISSION IN RARE-EARTH-DOPED GaN ELECTROLUMINESCENT DEVICES. D.S. Lee, A.J. Steckl, University of Cincinnati, Nanoelectronics Laboratory, Cincinnati, OH.

#### **L6.15**

ELECTRON MICROPROBE AND PHOTOLUMINESCENCE ANALYSIS OF EUROPIUM-DOPED GALLIUM NITRIDE LIGHT EMITTERS. R.W. Martin, S. Dalmaso, K.P. O'Donnell, Department of Physics, Strathclyde University, Glasgow, UNITED KINGDOM; A. Yoshida, Toyohashi University of Technology, Tenpaku, Toyohashi, JAPAN; the RENiBEL Network.

#### **L6.16**

LATTICE LOCATION AND CATHODOLUMINESCENCE STUDIES OF YTTERBIUM/THULIUM DOPED ALUMINIUM NITRIDE. Ulrich Vetter, Jan Zenneck, Carsten Ronning, Hans Hofsä, 2. Physikalisches Institut, Universität Göttingen, Göttingen, GERMANY; Marc Dietrich, ISOLDE Collaboration, CERN, Geneva, SWITZERLAND.

#### **L6.17**

MULTICOLOR INTEGRATION ON RARE-EARTH DOPED GaN ELECTROLUMINESCENT THIN FILMS. Y.Q. Wang and A.J. Steckl, Nanoelectronics Laboratory, Department of Electrical and Computer Engineering & Computer Sciences, University of Cincinnati, Cincinnati, OH.

#### **L6.18**

ELECTROLUMINESCENCE FROM Eu-DOPED GaN MIS STRUCTURE. W.M. Jadwisieniczak, H.J. Lozykowski, School of Electrical Engineering and Computer Science, Ohio University, Athens, OH; E. Kowalczyk, Institute of Electron Technology, Warsaw, POLAND; A.E. Kowalczyk, Institute of Electronic Materials Technology, Warsaw, POLAND.

#### **L6.19**

ANALYZING THE ELECTRICAL CHARACTERISTICS OF THE Si-DOPED InGaN/GaN SHORT-PERIOD SUPERLATTICE TUNNELING CONTACT LAYER ON THE LIGHT-EMITTING DIODES. T.C. Wen, S.J. Chang, L.W. Wu, Y.K. Su, W.C. Lai, C.H. Kuo, C.H. Chen, Institute of Microelectronics & Department of Electrical Engineering, National Cheng Kung University, TAIWAN; J.K. Sheu, Optical Science Center, National Central University, TAIWAN.

#### **L6.20**

THE PROPERTIES OF A P IMPLANTED GaN LIGHT-EMITTING DIODE. Junjiroh Kikawa, Seikoh Yoshida and Yoshiteru Itoh, Yokohama R&D Laboratories, The Furukawa Electric Co., Ltd., Nishi-ku, Yokohama, JAPAN.

#### **L6.21**

PROPERTIES OF GaN/InGaN MQW LEDs WITH Mn

IMPLANTED p-GaN CONTACT LAYERS. A.Y. Polyakov, N.B. Smirnov, A.V. Govorkov, Institute of Rare Metals, Moscow, RUSSIA; G.T. Thaler, M.E. Overberg, R. Frazier, C.R. Abernathy, J. Kim, F. Ren and S.J. Pearton, University of Florida, Gainesville, FL.

**L6.22**  
EFFECT OF THICKNESS VARIATION IN HIGH-EFFICIENCY InGaN/GaN LIGHT EMITTING DIODES. J. Narayan and H. Wang, Department of Materials Science and Engineering North Carolina State University, Raleigh, NC; Jinlin Ye, Schang-Jing Hon, Kenneth Fox, Jyh Chia Chen, H.K. Choi, and John C.C. Fan, Kopin Corporation, Taunton, MA.

**L6.23**  
Abstract Withdrawn

**L6.24**  
EFFECTS OF TRANSPARENT METAL SIZE ON OPTICAL PROPERTIES OF GALLIUM NITRIDE BASED LED. Jaehye Cho, Hye Jeong Oh, C. Sone, Y. Park, Materials and Devices Lab., Samsung Advanced Institute of Technology, Suwon, KOREA.

**L6.25**  
INFLUENCE OF Si-DOPING ON THE CHARACTERISTICS OF InGaN/GaN MULTIPLE QUANTUM WELL BLUE LIGHT EMITTING DIODES. J.M. Tsai, South Epitaxy Corporation, TAIWAN; T.C. Wen, S.J. Chang, L.W. Wu, Y.K. Su, W.C. Lai, C.H. Kuo, C.H. Chen, J.F. Chen, Institute of Microelectronics & Department of Electrical Engineering, National Cheng Kung University, TAIWAN; J.K. Sheu, Optical Science Center, National Central University, TAIWAN.

**L6.26**  
GaN/InGaN MQW LEDs WITH THE n-GaN LAYER ON TOP GROWN BY MBE AND DOPED WITH Mn. A.Y. Polyakov, N.B. Smirnov, A.V. Govorkov, Institute of Rare Metals, Moscow, RUSSIA; G.T. Thaler, M.E. Overberg, R. Frazier, J. Kim, F. Ren and S.J. Pearton, University of Florida, Dept of Materials Science and Engineering, Gainesville, FL.

**L6.27**  
FABRICATION AND CHARACTERIZATION OF III-NITRIDE MICRO-SIZE UV EMITTERS. K.H. Kim, S.X. Jin, J.Y. Lin, and H.X. Jiang, Department of Physics, Kansas State University, Manhattan, KS.

**L6.28**  
EFFICIENT GaN-BASED MICRO-LED ARRAYS. H.W. Choi, C.W. Jeon, M.D. Dawson, Institute of Photonics, University of Strathclyde, UNITED KINGDOM; P.R. Edwards, R.W. Martin, Dept of Physics, University of Strathclyde, UNITED KINGDOM.

**L6.29**  
CHARACTERISTICS OF STRAIN INDUCED CLEAVED FACET IN InGaN LASER DIODE ON EPITAXIALLY LATERAL OVERGROWN GaN ON SAPPHIRE. Kwang- Ki Choi, S.H. Chae, J.S. Kwak, J. Cho, O.H. Nam, Materials and Devices Laboratory, Samsung Advanced Institute of Technology, Suwon, KOREA.

**L6.30**  
GROWTH AND CHARACTERIZATION OF DEEP UV EMITTER STRUCTURES GROWN ON SINGLE CRYSTAL BULK AlN SUBSTRATES. X. Hu, R. Gaska, Sensor Electronic Technology, Inc, Latham, NY; C. Chen, J. Yang, E. Kuokstis, A. Khan, Univ of South Carolina, Dept of EE, Columbia, SC; G. Tamulaitis, I. Yilmaz, M.S. Shur, Rensselaer Polytechnic Institute, Dept of ECE and CIE, Troy, NY; C. Rojo, L. Schowalter, Crystal IS, Inc, Latham, NY.

**L6.31**  
DEPOSITION OF GaN FILMS ON GLASS SUBSTRATE AND ITS APPLICATION TO UV ELECTROLUMINESCENT DEVICES. T. Honda, K. Iga and H. Kawanishi, Dept. of Electronic Engineering, Kohgakuin University, JAPAN; T. Sakaguchi and F. Koyama, P&I Lab., Tokyo Institute of Technology, JAPAN.

**L6.32**  
Transferred to L8.3

**L6.33**  
GaN CHANNEL WAVEGUIDES FOR 1.5 μM OPERATION. C.C. Baker, A.J. Steckl, Nanoelectronics Laboratory, University of Cincinnati, Dept. of Electrical and Computer Engineering and Computer Science, Cincinnati, OH.

**L6.34**  
GROWTH AND FABRICATION OF HIGH REVERSE BREAKDOWN HETEROJUNCTION N-GaN: P- 6H-SiC DIODES.

A.V. Sampath, A. Bhattacharyya, R. Singh, P. Lamarre<sup>a</sup>, C.R. Eddy, T.D. Moustakas, ECE Department, Boston University, Boston MA; <sup>a</sup>Viatronix Inc., Waltham, MA.

**L6.35**  
EDGE TERMINATION DESIGN AND SIMULATION FOR BULK GaN RECTIFIERS. K.H. Baik, University of Florida, Dept of Materials Science and Engineering, Gainesville, FL; Y. Irokawa, Toyota Central Research Laboratories, Aichi, JAPAN; Fan Ren, University of Florida, Dept of Chemical Engineering, Gainesville, FL; S. Pearton, University of Florida, Dept of Materials Science and Engineering, Gainesville, FL; S.S. Park, Y.J. Park, Samsung Advanced Institute of Technology, Suwon, SOUTH KOREA.

**L6.36**  
PROPERTIES OF SURFACE ACOUSTIC WAVES IN AlN AND GaN. Jianyu Deng<sup>a</sup>, Daumantas Ciplys<sup>b</sup>, Gang Bu<sup>c</sup>, Michael Shur<sup>c</sup> and Remis Gaska<sup>a</sup>; <sup>a</sup>Sensor Electronic Technology, Inc., Columbia, SC; <sup>b</sup>Vilnius University, Physics Faculty, Department of Radiophysics, Laboratory of Physical Acoustics, Vilnius, LITHUANIA; <sup>c</sup>CIEEM and Dept. of ECSE, Rensselaer Polytechnic Institute, Troy, NY.

**L6.37**  
SURFACE ACOUSTIC WAVE RESONATORS FROM THICK MOVPE-GROWN LAYERS OF GaN(0001) ON SAPPHIRE. Sverre V. Pettersen, Thomas Tybell, Arne Rønnekleiv, and Jostein K. Grepstad, Dept of Physical Electronics, Norwegian University of Science and Technology (NTNU), Trondheim, NORWAY; Veit Schwegler, Dept of Optoelectronics, University of Ulm, Ulm, GERMANY.

**L6.38**  
CHARACTERISTICS ANALYSIS OF SAW FILTER FOR MICRO-WAVE USING UNDOPEDED-GaN THIN FILM. Cheol-Yeong Jang, Min-Jung Park, Eun-Ja Jung, Hyun-Chul Choi, Jung-Hee Lee, Yong-Hyun Lee, School of Electronic Engineering & Computer Science, Kyungpook National University, Daegu, KOREA.

**L6.39**  
DEVELOPMENT OF A THIN FILM WIDE BANDGAP SEMICONDUCTOR WAVEGUIDE FOR MICROFLUIDIC DRUG DELIVERY. Mona R. Safadi, Claudine A. Jaboro, Alexander L. Lagman, Gregory W. Auner, Wayne State University, Dept of Electrical and Computer Engineering/Biomedical Engineering, Detroit, MI; Daad Haddad, Yuri Danylyuk, Ratna Naik, Wayne State University, Physics Department, Detroit, MI.

**L6.40**  
OPTIMIZATION OF A Pd/AlN/Si THIN FILM STRUCTURE FOR HYDROGEN GAS SENSING. Wenjun Mo, K.Y.S. Ng, Dept. of Chemical Engineering and Materials Science, Wayne State University, Detroit, MI; E.F. McCullen, R. Naik, Dept. of Physics and Astronomy, Wayne State University, Detroit, MI; L. Rimai, G.W. Auner, Dept. of Electrical and Computer Engineering, Wayne State University, Detroit, MI.

**L6.41**  
SELECTIVE GAS SENSORS BASED ON GaN LAYERS AND SnO<sub>2</sub>/GaN HETEROSTRUCTURES. V. Popa, G. Korotchenkov, I.M. Tiginyanu and V. Brynzari, Laboratory of Low-Dimensional Semiconductor Structures, Technical Univ of Moldova, Chisinau, MOLDOVA; S.M. Hubbard and D. Pavlidis, Dept of Electrical Engineering and Computer Science, Univ of Michigan, Ann Arbor, MI.

SESSION L7: UV EMITTERS AND DETECTORS  
Chair: E. Fred Schubert  
Wednesday Morning, December 4, 2002  
Room 302 (Hynes)

**8:30 AM \*L7.1**  
GaN/AlGaN ULTRAVIOLET LIGHT EMITTERS: GOALS AND CHALLENGES. Paul Fini, Materials Dept., Univ. of California, Santa Barbara, Santa Barbara, CA.

**9:00 AM L7.2**  
A GaN-FREE LED STRUCTURE FOR HIGH UV-LIGHT EXTRACTION. Toshio Nishida, Naoki Kobayashi, NTT Basic Research Laboratories, NTT Corporation, Kanagawa, JAPAN; Tomoyuki Ban, NEL Technosupport, Kanagawa, JAPAN.

**9:15 AM L7.3**  
HOLE INJECTION AND CARRIER RECOMBINATION IN 280 NM DEEP ULTRAVIOLET LIGHT EMITTING DIODES AT ROOM AND CRYOGENIC TEMPERATURES. M. Shatalov, V. Adivarahan,

J.P. Zhang, A. Chitnis, S. Wu, R. Pachipulusu, V. Mandavilli, and M. Asif Khan, Dept of Electrical Engineering, Univ of South Carolina, Columbia, SC.

**9:30 AM L7.4**

NEW UV LIGHT EMITTER BASED ON AlGa<sub>n</sub> HETERO-STRUCTURES WITH GRADED ELECTRON AND HOLE INJECTORS. M.A.L. Johnson, N.C. State University, Materials Science and Engineering Department, Raleigh, NC; J.P. Long and J.F. Schetzina, N.C. State University, Physics Department, Raleigh, NC.

**9:45 AM BREAK**

**10:15 AM L7.5**

MOCVD GROWTH OF AlGa<sub>n</sub> ALLOYS FOR 300nm LEDs. A.A. Allerman, A.J. Fischer, D.D. Koleske, K.H.A. Bogart, R.J. Shul, Steven R. Kurtz, J.J. Figiel, and K.W. Fullmer, Sandia National Laboratories, Albuquerque, NM.

**10:30 AM L7.6**

WIDE BAND-GAP LIGHT EMITTERS WITH IMPROVED HOLE INJECTION. S.M. Komirenko, K.W. Kim, Dept of Electrical and Computer Engineering, North Carolina State University, Raleigh, NC; J.M. Zavada, U.S. ARO, Research Triangle Park, NC; V.A. Kochelap, Institute of Semiconductor Physics, Kiev, UKRAINE.

**10:45 AM L7.7**

HIGH-POWER 325 NM LIGHT-EMITTING DIODE ARRAYS BY FLIP-CHIP PACKAGING. A. Chitnis, M. Shatalov, V. Adivarahan, J.P. Zhang, W. Shuai, S. Sun and M. Asif Khan, Department of Electrical Engineering, University of South Carolina, Columbia, SC.

**11:00 AM L7.8**

MICRO-RAMAN SPECTROSCOPY: SELF-HEATING EFFECTS IN DEEP UV LIGHT EMITTING DIODES. A. Sarua, M. Kuball, H.H. Wills Physics Lab, Univ of Bristol, Bristol, UNITED KINGDOM; M.J. Uren, QinetiQ Ltd, Malvern, UNITED KINGDOM; A. Chitnis, J.P. Zhang, V. Adivarahan, M. Shatalov, and M. Asif Khan, Dept of Electrical Engineering, Univ of South Carolina, Columbia, SC.

**11:15 AM L7.9**

EPITAXIAL GROWTH FOR SOLAR-BLIND ALGAN PHOTODETECTOR IMAGING ARRAYS BY METALORGANIC CHEMICAL VAPOR DEPOSITION. Uttiya Chowdhury, Charles J. Collins, Michael M. Wong, Ting Gang Zhu, Jonathan C. Denyszyn, Jin Ho Choi, Bo Yang, Joe C. Campbell, and Russell D. Dupuis, The University of Texas at Austin, Microelectronics Research Center, Austin, TX.

**11:30 AM L7.10**

CRACK NUCLEATION IN AlGa<sub>n</sub>/Ga<sub>n</sub> HETEROSTRUCTURES. Peter J. Parbrook, Malcolm A Whitehead, III-V Central Facility, University of Sheffield, Sheffield, UNITED KINGDOM; Robert T. Murray, Department of Materials Science and Engineering, University of Liverpool, Liverpool, UNITED KINGDOM.

**11:45 AM L7.11**

SOLAR-BLIND AlGa<sub>n</sub>-BASED SCHOTTKY PHOTODIODES WITH HIGH DETECTIVITY AND LOW NOISE. Necmi Biyikli, Orhan Aytur, Bilkent University, Dept of Electrical and Electronics Engineering, Ankara, TURKEY; Ibrahim Kimukin, Turgut Tut, Ekmel Ozbay, Bilkent University, Dept of Physics, Ankara, TURKEY.

SESSION L8: VISIBLE LIGHT EMITTERS

Chair: Christian M. Wetzel

Wednesday Afternoon, December 4, 2002

Room 302 (Hynes)

**1:30 PM \*L8.1**

HIGH-POWER Ga<sub>n</sub>-BASED LEDS FOR SOLID-STATE LIGHTING AND DISPLAYS. S.A. Stockman, A.Y. Kim, M. Misra, P. Grillot, L. Cook, R. Mann, W. Goetz, M.R. Krames, D. Steigerwald, D. Collins, P.S. Martin, J. Sun, S. Watanabe, Lumileds Lighting, San Jose, CA.

**2:00 PM L8.2**

InGa<sub>n</sub>/Ga<sub>n</sub> TUNNEL INJECTION BLUE LIGHT EMITTING DIODES. T.C. Wen, S.J. Chang, L.W. Wu, Y.K. Su, W.C. Lai, C.H. Kuo, C.H. Chen, J.F. Chen, Institute of Microelectronics & Department of Electrical Engineering, National Cheng Kung University, TAIWAN; J.K. Sheu, Optical Science Center, National Central University, TAIWAN.

**2:15 PM L8.3**

GROWTH OF HIGH-x N-TYPE Al<sub>x</sub>Ga<sub>1-x</sub>N FOR SOLAR-BLIND PHOTODETECTORS. M. Pophristic, SP. Guo and B. Peres,

EMCORE, Somerset, NJ; P. Lamarre, K.K. Wong, A. Hairston, J.S. Ahearn and M.B. Reine, BAE SYSTEMS, Lexington, MA and Nashua, NH; B. Yang and J. Campbell, Microelectronics Research Center, University of Texas, Austin, TX.

**2:30 PM BREAK**

**3:00 PM L8.4**

BLUE LIGHT EMITTING DIODES IN NANOMETER SCALE PATTERNED InGa<sub>n</sub> MEDIA. Lu Chen, A. Yin, J.S. Im, A.V. Nurmikko, J.M. Xu, Brown University, Division of Engineering and Department of Physics, Providence, RI; J. Han, Yale University, Department of Electrical Engineering, New Haven, CT.

**3:15 PM L8.5**

ENHANCED LIGHT EXTRACTION OF InGa<sub>n</sub> MQW BY SURFACE PLASMON. C.C. Lee, Optical Science Center, National Central University, Jung-Li, TAIWAN; C.Y. Chang, G.C. Chi, Department of Physics, National Central University, Jung-Li, TAIWAN; Y.L. Huang, Institute of Optical Sciences, National Central University, Jung-Li, TAIWAN; W.H. Lan, J.C. Lin, Y.D. Shiang, Chung-Sun Institute of Sciences and Technology, Lung-Tan, TAIWAN.

**3:30 PM L8.6**

OPTICAL REFLECTANCE MEASUREMENTS OF THE 3D TO 2D DELAYED RECOVERY OF Ga<sub>n</sub> ON SAPPHIRE WITH CORRELATION TO IMPROVED 380 nm LED BRIGHTNESS. D.D. Koleske, A.J. Fischer, A.A. Allerman, C.C. Mitchell, S.R. Kurtz, J.J. Figiel, K.W. Fullmer, and W.G. Breiland, Sandia National Laboratories, Albuquerque, NM.

**3:45 PM L8.7**

MULTISUBBAND PHOTOLUMINESCENCE FROM P-TYPE AlGa<sub>n</sub>/Ga<sub>n</sub> SUPERLATTICES UNDER INTENSITY-DEPENDENT EXCITATION. Erik L. Waldron, E. Fred Schubert, Boston University, Dept of Physics and Electrical and Computer Engineering Department, Boston, MA; Amir M. Dabiran, SVT Associates, Eden Prairie, MN.

**4:00 PM L8.8**

FORMATION OF QUANTUM DOTS BY SELF-REARRANGEMENT OF METASTABLE 2D Ga<sub>n</sub>. Noëlle Gogneau, Christoph Adelmann, Bruno Daudin, Eva Monroy, Jean-Luc Rouvière, Eirini Sarigiannidou CEA-Grenoble, Equipe mixte CEA-CNRS-UJF Nanostructures et Semiconducteurs, FRANCE.

**4:15 PM L8.9**

SELF-ASSEMBLED Ga<sub>n</sub> QUANTUM DOTS ON 6H-SiC(0001) SUBSTRATES. C.-W. Hu, A. Bell, D.J. Smith, F.A. Ponce, and I.S.T. Tsong, Arizona State University, Department of Physics and Astronomy, Tempe, AZ.

**4:30 PM L8.10**

MBE GROWTH OF HIGH-QUALITY QUATERNARY InAlGa<sub>n</sub> THIN FILMS AND QUANTUM WELL HETEROSTRUCTURES. Alexandros Georgakilas, Emmanuel Dimakis, Maria Androulidaki, Katerina Tsagaraki, Nikolaos T. Pelekanos, FORTH and University of Crete, Heraklion, GREECE; Philomela Komninou, Aristotle University of Thessaloniki, Thessaloniki, GREECE; Denis Jalabert, Edith Bellet-Amalric, CEA, Grenoble, FRANCE.

**4:45 PM L8.11**

RAPID THERMAL MOCVD GROWTH OF Ga<sub>n</sub> AND InGa<sub>n</sub> LAYERS. O. Kreinin, G. Bahir, and J. Salzman, Technion-The Israel Institute of Technology, Department of Electrical Engineering, Solid State Institute, and Microelectronics Research Center, Haifa, ISRAEL.

SESSION L9: ELECTRONIC DEVICES

Chair: Angela Rizzi

Thursday Morning, December 5, 2002

Room 302 (Hynes)

**8:30 AM \*L9.1**

MATERIAL AND DEVICE ISSUES OF AlGa<sub>n</sub>/Ga<sub>n</sub> HEMTs ON SILICON SUBSTRATES. P. Kordos, P. Javorka, M. Marso, M. Wolter and A. Fox, Institute of Thin Films and Interfaces, Research Centre Jülich, GERMANY; A. Alam and M. Heuken, Aixtron AG, Aachen, GERMANY.

**9:00 AM L9.2**

HIGH-QUALITY AlGa<sub>n</sub>/Ga<sub>n</sub> HEMTs GROWN BY MBE ON SEMI-INSULATING 6H AND 4H SILICON CARBIDE. M.J. Manfra, N.G. Weimann, K.K.W. Baldwin, and J.W.P. Hsu, Bell Laboratories, Lucent Technologies, Murray Hill, NJ.



**9:15 AM L9.3**

AlGa<sub>N</sub>/Ga<sub>N</sub> HETEROSTRUCTURE FIELD-EFFECT TRANSISTORS WITH BACK-DOPING DESIGN FOR HIGH-POWER APPLICATIONS: HIGH CURRENT DENSITY WITH HIGH TRANSCONDUCTANCE CHARACTERISTICS.

Narihiko Maeda, Kotaro Tsubaki, Tadashi Saitoh, Takehiko Tawara, Naoki Kobayashi, NTT Basic Research Laboratories, NTT Corporation, Kanagawa, JAPAN.

**9:30 AM L9.4**

HIGH-QUALITY AlGa<sub>N</sub>/Ga<sub>N</sub> HFET STRUCTURES GROWTH BY MOCVD USING AN INTERMEDIATE HIGH TEMPERATURE

AlGa<sub>N</sub>/Ga<sub>N</sub> SUPERLATTICES. Alexander Demchuk, Gordon Munns, Peter Nussbaum, Don Olson, Andy Strom and Anil Jain, APA Optics, Inc, Blaine, MN.

**9:45 AM L9.5**

AlGa<sub>N</sub>/Ga<sub>N</sub> HETEROJUNCTION FAT FET DRIFT MOBILITY MEASUREMENTS AND VOLTAGE DEPENDENCIES. O. Katz, A. Horn, V. Garber, B. Meyler, G. Bahir, and J. Salzman, Department of Electrical Engineering and Microelectronics Research Center, Technion, Israel Institute of Technology, Haifa, ISRAEL.

**10:00 AM BREAK****10:30 AM L9.6**

HIGH PERFORMANCE HFET DEVICES ON SAPPHIRE AND SiC: PASSIVATION WITH AlN. J.A. Bardwell, J.B. Webb, H. Tang, and Y. Liu, National Research Council Canada, Institute for Microstructural Sciences, Ottawa, ON, CANADA.

**10:45 AM L9.7**

SELF-HEATING EFFECTS IN MULTI-FINGER AlGa<sub>N</sub>/Ga<sub>N</sub> HFETs. M. Kuball, S. Rajasingam, A. Sarua, University of Bristol, H.H. Wills Physics Laboratory, Bristol, UNITED KINGDOM; M.J. Uren, T. Martin, R.S. Balmer, B.T. Hughes, K.P. Hilton, QinetiQ Ltd, Malvern, UNITED KINGDOM.

**11:00 AM L9.8**

SPIN SPLITTING IN AlGa<sub>N</sub>/Ga<sub>N</sub> HETEROSTRUCTURES. Jacek A. Majewski, Peter Vogl, Walter Schottky Institute and Physics Department, Technical University of Munich, GERMANY.

**11:15 AM L9.9**

InGa<sub>N</sub> CHANNEL DOUBLE HETEROSTRUCTURE FIELD - EFFECT TRANSISTORS: DC, PULSE AND RF CHARACTERISTICS. H.-M. Wang, J.-P. Zhang, A. Koudymov, S. Saygi, H. Fatima, G. Simin, J. Yang, and M. Asif Khan, Department of Electrical Engineering, Univ. of South Carolina, Columbia, SC; X. Hu, A. Tarakji, M.S. Shur, and R. Gaska, Sensor Electronic Technology, Inc., Latham, NY.

**11:30 AM L9.10**

GATE CURRENT AND ANALYTICAL MODELING IN INSULATING GATE III-N HETEROSTRUCTURE FIELD EFFECT TRANSISTORS. Frederick W. Clarke, U.S. Army Space and Missile Command Technical Center, Huntsville, AL; Fat Duen Ho, Department of Electrical and Computer Engineering, The University of Alabama in Huntsville, Huntsville, AL; M. Asif Khan, Grigory Simin, J. Yang, Department of Electrical Engineering, The University of South Carolina, Columbia, SC; Remis Gaska, Sensor Electronics Technology Inc., Latham, NY; and Michael S. Shur, ECSE Department, Rensselaer Polytechnical Institute, Troy, NY.

**11:45 AM L9.11**

DELTA-DOPED AlGa<sub>N</sub>/Ga<sub>N</sub> METAL OXIDE SEMICONDUCTOR HFETs WITH HIGH BREAKDOWN VOLTAGES. Z.Y. Fan, J. Li, J.Y. Lin, and H.X. Jiang, Department of Physics, Kansas State University, Manhattan, KS.

SESSION L10: CHARACTERIZATION OF DEFECTS AND TRANSPORT

Chair: Michael J. Manfra

Thursday Afternoon, December 5, 2002  
Room 302 (Hynes)

**1:30 PM \*L10.1**

ELECTRICAL AND OPTICAL PROPERTIES OF VERY PURE Ga<sub>N</sub>. D.C. Look, Semiconductor Research Center, Wright State University, Dayton, OH; S.S. Park and J.H. Han, Samsung Advanced Institute of Technology, Suwon, KOREA.

**2:00 PM L10.2**

OBSERVATIONS OF ELECTRON VELOCITY OVERSHOOT DURING HIGH-FIELD TRANSPORT IN AlN. Ramon Collazo,

Raoul Schlessler, Amy Roskowski, Robert F. Davis, Zlatko Sitar, North Carolina State Univ, Dept. of Materials Sci & Eng, Raleigh, NC.

**2:15 PM L10.3**

CYCLOTRON RESONANCE ON HIGH MOBILITY 2DEGS IN AlGa<sub>N</sub>/Ga<sub>N</sub> HETEROSTRUCTURES. S. Syed, Columbia Univ., New York, NY; M. Manfra, Bell Labs, Murray Hill, NJ; Y.-J. Wang, NHMFL, Tallahassee, FL; R.J. Molnar, MIT, Cambridge, MA; H.L. Stormer, Columbia Univ., New York, NY and Bell Labs, Murray Hill, NJ; L.N. Pfeiffer, Bell Labs, Murray Hill, NJ; K.W. West, Bell Labs, Murray Hill, NJ.

**2:30 PM L10.4**

ELECTROREFLECTANCE STUDIES OF THE AlGa<sub>N</sub>/Ga<sub>N</sub> HETEROSTRUCTURE AND 2-DIMENSIONAL ELECTRON GAS. S.R. Kurtz, A.A. Allerman, D.D. Koleske, and G.M. Peake, Sandia National Laboratories, Albuquerque, NM.

**2:45 PM BREAK****3:15 PM L10.5**

ORIGIN OF THE EFFICIENT LIGHT EMISSION AT INVERSION DOMAIN BOUNDARIES IN Ga<sub>N</sub>. Vincenzo Fiorentini, INFN and Dipartimento di Fisica, Università di Cagliari, ITALY.

**3:30 PM L10.6**

PHOTO-ELECTRON EMISSION MICROSCOPY (PEEM) OBSERVATION OF INVERSION DOMAIN BOUNDARIES OF Ga<sub>N</sub>-BASED LATERAL POLARITY HETEROSTRUCTURES. Woochul Yang, B.J. Rodriguez, R.J. Nemanich, North Carolina State Univ., Dept of Physics, Raleigh, NC; O. Ambacher, Technical University Ilmenau, Institute for Solid State Electronics Nanotechnology, Ilmenau, GERMANY.

**3:45 PM L10.7**

CONCENTRATION-DEPENDENT CARBON DOPING BEHAVIOR IN MBE-GROWN Ga<sub>N</sub> AND ITS INFLUENCE ON ELECTRICAL AND OPTICAL PROPERTIES. Rob Armitage, Qing Yang, Henning Feick, Jonathan Lim, Eicke R. Weber, Dept of Materials Science and Engineering, University of California, Berkeley, and Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA.

**4:00 PM L10.8**

QUANTITATIVE DETERMINATION OF THE KINETICS OF NANOTUBE GROWTH IN Ga<sub>N</sub>. E.A. Stach, National Center for Electron Microscopy, Lawrence Berkeley National Laboratory, Berkeley, CA; W.S. Wong and M. Kneissl, Palo Alto Research Center, Palo Alto, CA.

**4:15 PM L10.9**

HOLLOW-CORE DISLOCATIONS IN Mg-DOPED AlGa<sub>N</sub>. David Cherns, Marcus Q. Baines, Suman-Lata Sahonta, Yiqian Wang, Bristol Univ, Dept of Physics, Bristol, UNITED KINGDOM; Rong Liu, Fernando A. Ponce, Arizona State Univ, Dept of Physics, Tempe, AZ; Hiroshi Amano, Isamu Akasaki, Dept of Mat. Sci and Eng, Meijo Univ, Nagoya, JAPAN.

**4:30 PM L10.10**

DEVELOPMENT OF A HIGH-RESOLUTION ELECTRON BEAM INDUCED CURRENT TECHNIQUE FOR ELECTRICAL CHARACTERIZATION OF InGa<sub>N</sub>-BASED QUANTUM WELL LIGHT EMITTING DIODES. K.L. Bunker, J.C. Gonzalez, A.D. Batchelor, P.E. Russell, Materials Science and Engineering Department, North Carolina State University, Raleigh, NC; T.J. Stark, Materials Analytical Services, Raleigh, NC.

**4:45 PM L10.11**

BANDGAP EVOLUTION, HYBRIDIZATION AND THERMAL STABILITY OF In<sub>x</sub>Ga<sub>1-x</sub>N ALLOYS MEASURED BY SOFT X-RAY EMISSION AND ABSORPTION. Cormac McGuinness, Philip Ryan, James E. Downes, Kevin E. Smith, Boston University, Physics Dept., Boston, MA; Dharanipal Doppalapudi, Theodore D. Moustakas, Boston University, Electrical and Computer Engineering Department, Boston, MA.

SESSION L11: POSTER SESSION

Thursday Evening, December 5, 2002  
8:00 PM

Exhibition Hall D (Hynes)

**L11.1**

BLUE LUMINESCENCE IN UNDOPED AND Zn-DOPED Ga<sub>N</sub>. M.A. Reshchikov, H. Morkoc, Dept. of Electrical Engineering, VCU, Richmond, VA; R.J. Molnar, MIT Lincoln Laboratory, Lexington, MA; D. Tsvetkov and V. Dmitriev, TDI, Inc., Silver Spring, MD.

**L11.2**

SURFACE-RELATED PHOTOLUMINESCENCE EFFECTS IN GaN. M.A. Reshchikov, D. Huang, M. Zafar Iqbal, L. He, and H. Morkoç, Dept. of Electrical Engineering, Virginia Commonwealth University, Richmond, VA.

**L11.3**

EXCITONS BOUND TO SURFACE DEFECTS IN GaN. M.A. Reshchikov, D. Huang, and H. Morkoç, Dept. of Electrical Engineering, Virginia Commonwealth University, Richmond, VA.

**L11.4**

TUNNEL EFFECTS IN LUMINESCENCE SPECTRA OF GaN-BASED HETEROSTRUCTURES. A.E. Yunovich, V.E. Kudryashov, A.N. Turkin, Dept of Physics, M.V. Lomonosov Moscow State University, Moscow, RUSSIA; M. Leroux, S. Dalmaso, CRHEA-CNRS, Valbonne, FRANCE.

**L11.5**

SELF-INDUCED PHOTON ABSORPTION BY SCREENING OF ELECTRIC FIELDS IN NITRIDE BASED QUANTUM WELLS. Sokratis Kalliakos, Pierre Lefebvre, Thierry Taliercio, Bernard Gil, CNRS, Universite Montpellier II, FRANCE.

**L11.6**

TIME-RESOLVED OPTICAL STUDIES OF InGaN LAYERS GROWN ON LGO SUBSTRATES. Maurice Cheung, Fei Chen, Madalina Furis, A.N. Cartwright, University at Buffalo, State University of New York, Buffalo, NY; Gon Namkoong, W. Alan Doolittle, Georgia Institute of Technology, Atlanta, GA; April Brown, Duke University, Durham, NC.

**L11.7**

Abstract Withdrawn

**L11.8**

FEMTOSECOND PUMP AND PROBE SPECTROSCOPY OF OPTICAL NONLINEARITIES IN InGaN/GaN HETEROSTRUCTURES. Fei Chen, M.C. Cheung, Paul M. Sweeney, W.D. Kirkey, M. Furis, A.N. Cartwright, Department of Electrical Engineering, University at Buffalo, Buffalo, NY.

**L11.9**

RELATION BETWEEN STRUCTURAL AND OPTICAL PROPERTIES OF InGaN HETEROSTRUCTURES CLOSE TO THE CRITICAL LAYER THICKNESS: THE INFLUENCE OF STRAIN ON THE EMISSION ENERGIES. S. Pereira, M.R. Correia, E. Pereira, Departamento de Física, Universidade de Aveiro, PORTUGAL; K.P. O'Donnell, C. Trager-Cowan, F. Sweeney, Department of Physics, University of Strathclyde, Glasgow, UNITED KINGDOM.

**L11.10**

UNUSUAL TEMPERATURE DEPENDENCE OF THE PHOTOLUMINESCENCE PEAK ENERGY AND LINEWIDTH IN InGaN/GaN QUANTUM WELLS. R. Pecharrroman-Gallego, R.W. Martin, Dept. of Physics, University of Strathclyde, Glasgow, Scotland, UNITED KINGDOM; I.M. Watson, Institute of Photonics, University of Strathclyde, Glasgow, Scotland, UNITED KINGDOM.

**L11.11**

EXCITONS OF THE STRUCTURE IN ZINC-BLENDE  $In_xGa_{1-x}N$  AND THEIR PROPERTIES. Dimitar Alexandrov, Department of Electrical Engineering, Lakehead University, Thunder Bay, Ontario, CANADA.

**L11.12**

SIMULTANEOUS TEM AND CATHODOLUMINESCENCE IMAGING OF NON UNIFORMITY IN InGaN QUANTUM WELLS. N.M. Boyall, K. Durose, Dept of Physics, University of Durham, UNITED KINGDOM; C. Liu, I.M. Watson, Institute of Photonics, University of Strathclyde, UNITED KINGDOM.

**L11.13**

AN IN-SITU TEM-CATHODOLUMINESCENCE STUDY OF ELECTRON BEAM DEGRADATION OF LUMINESCENCE FROM GaN AND InGaN QUANTUM WELLS. N.M. Boyall, K. Durose, Department of Physics, University of Durham, UNITED KINGDOM; I.M. Watson, Institute of Photonics, University of Strathclyde, UNITED KINGDOM.

**L11.14**

ROOM-TEMPERATURE TIME-RESOLVED PHOTOLUMINESCENCE OF UV EMISSION FROM GaN/AlN QUANTUM WELLS. Madalina Furis, Fei Chen, A.N. Cartwright, Dept of Electrical Engineering, University at Buffalo-State University of New

York, Buffalo, NY; Hong Wu, William J. Schaff, Dept of Electrical Engineering, Cornell University, Ithaca, NY.

**L11.15**

OPTICAL PROPERTIES OF AlN/GaN SUPERLATTICES GROWN BY METALORGANIC VAPOR PHASE EPITAXY. Vanya Darakchieva, Plamen P. Paskov, IFM, Linköping University, SWEDEN; Mathias Schubert, Universität Leipzig, GERMANY; Tanya Paskova, Bo Monemar, IFM, Linköping University, SWEDEN; Satoshi Kamiyama, M. Iwaya, Hiroshi Amano, Isamu Akasaki, Dept of Electrical and Electronic Engineering, Meijo University, JAPAN.

**L11.16**

PECULIARITIES OF OPTICAL PROPERTIES OF GaN/AlGaIn QUANTUM WELLS WITH INVERSION DOMAINS. Maria Tkachman, Shubina Tatiana, Jmerik Valentin, Ratnikov Valentin, Ivanov Sergey, Ioffe Physico-Technical Inst, St. Petersburg, RUSSIA; Bo Monemar, Linköping Univ, Dept of Physics and Measurement Technology, Linköping, SWEDEN.

**L11.17**

SIGNIFICANTLY ENHANCED BAND-EDGE PL EMISSION FROM GALLIUM NITRIDE GROWN ON SILICON(111) SUBSTRATE. Muchang Luo, Xiaoliang Wang, Jinmin Li, Hongxin Liu, Lei Wang, Yiping Zeng, Lanying Lin, Novel Semiconductor Material Laboratory, Institute of Semiconductor, Chinese Academy of Sciences, Beijing, P.R. CHINA.

**L11.18**

OPTICAL PROPERTIES OF CUBIC GaN DOPED BY Si. A. Ferreira da Silva and I. Pepe Universidade Federal da Bahia, Instituto de Física, Bahia, BRAZIL; C. Persson and R. Ahuja, Uppsala University, Department of Physics, Uppsala, SWEDEN; H. Arwin, O.P.A. Lindquist, and B. Sernelius, Linköping University, Department of Physics and Measurement Technology, Linköping, SWEDEN; D.J. As and K. Lischka, University of Paderborn, Paderborn, GERMANY.

**L11.19**

TEMPERATURE-INDUCED CHANGES IN OPTICAL REFLECTIVITY FROM MOCVD-GROWN AlN/GaN HETEROSTRUCTURES. I.M. Tiginyanu, V.V. Ursaki, N.N. Syrbu and V.V. Zalomai, Laboratory of Low-Dimensional Semiconductor Structures, Technical Univ of Moldova, Chisinau, MOLDOVA; S.M. Hubbard and D. Pavlidis, Dept of Electrical Engineering and Computer Science, Univ of Michigan, Ann Arbor, MI.

**L11.20**

COMPOSITION DEPENDENCE OF THE NONLINEAR COEFFICIENTS OF AlGaIn FILMS GROWN ON SAPPHIRE SUBSTRATES BY MOCVD AND HVPE. Norman A. Sanford, National Institute of Standards and Technology, Boulder, CO; Albert V. Davydov, Alexander J. Shapiro, National Institute of Standards and Technology, Gaithersburg, MD; Christine Russell, Simon Bates, Bede Scientific, Inc., Englewood, CO; Denis V. Tsvetkov, Vladimir A. Dmitriev, Technologies and Devices International Inc., Silver Spring, MD; Matthew H. Gray, National Institute of Standards and Technology, Boulder, CO; Stacia Keller, Umesh K. Mishra, Steven P. DenBaars, University of California, Santa Barbara, CA.

**L11.21**

MEASUREMENTS OF THE REFRACTIVE INDICES OF MOCVD AND HVPE GROWN AlGaIn FILMS USING PRISM-COUPLED TECHNIQUES CORRELATED WITH SPECTROSCOPIC REFLECTION/TRANSMISSION ANALYSIS. Norman A. Sanford, National Institute of Standards and Technology, Boulder, CO; Lawrence H. Robins, Albert V. Davydov, Alexander J. Shapiro, National Institute of Standards and Technology, Gaithersburg, MD; Denis V. Tsvetkov, Vladimir A. Dmitriev, Technologies and Devices International Inc., Silver Spring, MD; Stacia Keller, Umesh K. Mishra, Steven P. DenBaars, University of California, Santa Barbara, CA.

**L11.22**

OPTICAL BAND GAP MEASUREMENTS OF InN FILMS IN THE STRONG DEGENERACY LIMIT. D.B. Haddad, Dept. of Physics, Wayne State University, Detroit, MI; Y.V. Danylyuk, Dept. of Electrical and Computer Engineering, Wayne State University, Detroit, MI; J.S. Thakur, School of Physics, University of New South Wales, Sydney, AUSTRALIA; V.M. Naik, Department of Natural Sciences, University of Michigan-Dearborn, Dearborn, MI; R. Naik, Dept. of Physics, Wayne State University, Detroit, MI; G.W. Auner, Dept. of Electrical and Computer Engineering, Wayne State University, Detroit, MI; L.E. Wenger, Dept. of Physics, Wayne State University, Detroit, MI.

**L11.23**

A STUDY OF INDIUM NITRIDE FILMS GROWN UNDER

CONDITIONS RESULTING IN APPARENT BAND-GAPS FROM 0.7 TO 2.3 ELECTRON VOLTS. K. Scott A. Butcher, Marie Wintrebert-Fouquet, Trevor L. Tansley, Physics Department, Macquarie University, Sydney, AUSTRALIA; Motlan, Department of Physics, Faculty of Mathematics and Science, State University of Medan, INDONESIA; Heiko Timmers, Santosh Shrestha, School of Physics, University of New South Wales, Australian Defence Force Academy, Canberra, AUSTRALIA.

**L11.24**  
COMPOSITION DEPENDENCE OF THE FUNDAMENTAL BAND GAPS OF GROUP III-NITRIDE ALLOYS. J. Wu, W. Walukiewicz, K.M. Yu, J.W. Ager III and E.E. Haller, Division of Materials Sciences and Engineering, Lawrence Berkeley National Laboratory, and University of California, Berkeley, CA; Hai Lu and William J. Schaff, Department of Electrical and Computer Engineering, Cornell University, Ithaca, NY.

**L11.25**  
PRESSURE DEPENDENCE OF ENERGY BAND GAPS FOR InAlN. Z. Dridi<sup>a,b</sup>, B. Bouhafas<sup>a,b</sup>, and P. Ruterana<sup>a</sup>; <sup>a</sup>ESCTM-CRISMAT, UMR6508-CNRS, ISMRA 6, Caen, FRANCE; <sup>b</sup>LSMSM, Département de Physique, Faculté des Sciences, Université de Sidi-Bel-Abbes, Sidi-Bel-Abbes, ALGERIE.

**L11.26**  
ELECTRICAL AND OPTICAL PROPERTIES OF InN/Si HETEROSTRUCTURE. Kazuhiro Mizuo, Tomohiro Yamaguchi, Yoshiki Saito, Tsutomu Araki, Yasushi Nanishi, Ritsumeikan Univ, Dept of Photonics, Shiga, JAPAN.

**L11.27**  
OPTICAL PROPERTIES OF CONTROLLABLE SELF-ASSEMBLED LATERAL NANOSTRUCTURES ON InN, InAlN, AND AlN THIN FILMS. Yuriy Danylyuk, Dmitri Romanov, Eric McCullen, Gregory Auner, Wayne State University, Dept of Electrical and Computer Engineering, Detroit, MI; Daad Haddad, Ratna Naik, Wayne State University, Dept of Physics, Detroit, MI.

**L11.28**  
A STUDY OF DECOMPOSITION OF GaN DURING ANNEALING. M.A. Rana, M.B.H. Breese, T. Osipowicz, F. Watt, Research Centre for Nuclear Microscopy, Department of Physics, National University of Singapore, SINGAPORE; H.W. Choi, S.J. Chua, Department of Electrical Engineering, Centre for Optoelectronics, National University of Singapore, SINGAPORE.

**L11.29**  
STUDIES OF ELECTRON INJECTION-INDUCED EFFECTS IN III-NITRIDES. Leonid Chernyak, University of Central Florida, Dept of Physics, Orlando, FL.

**L11.30**  
ELECTRON STIMULATED DESORPTION OF DEUTERIUM FROM GaN(0001). Y. Yang, J. Lee, and B.D. Thoms, Georgia State University, Atlanta, GA.

**L11.31**  
ELECTRONICALLY ENHANCED DIFFUSION IN GaN. Yutaka Mera, Koji Maeda, Dept. of Applied Physics, The University of Tokyo, Tokyo, JAPAN; Kunio Suzuki, Institute of Industrial Science, The University of Tokyo, Tokyo, JAPAN.

**L11.32**  
BAND-LIKE AND LOCALIZED STATES INDUCED BY IRRADIATION IN HVPE N-GaN. Antonio Castaldini, Anna Cavallini, Laura Polenta, INFN and Dipartimento di Fisica, Bologna, ITALY.

**L11.33**  
HIGH-TEMPERATURE ILLUMINATION-INDUCED METASTABILITY IN UNDOPED SEMI-INSULATING GaN GROWN BY METALORGANIC VAPOR PHASE EPITAXY. Z-Q. Fang, B.B. Clafin, D.C. Look, Wright State Univ, Semiconductor Research Center, Dayton, OH; T.H. Myers, West Virginia Univ, Physics Dept, Morgantown, WV; D.D. Koleske, A.E. Wickenden, R.L. Henry, Naval Research Laboratory, Electronics Science and Technology Division, Washington, DC.

**L11.34**  
SUPPRESSING OF OPTICAL QUENCHING OF DEEP DEFECT-TO-BAND-TRANSITIONS IN GaN/AlGaN HETEROSTRUCTURES WITH HIGH Al CONTENTS. H. Witte, E. Schrenk, K. Flügge, A. Krtschil, A. Krost, J. Christen, Otto-von-Guericke-Universität Magdeburg, Institute of Experimental Physics, GERMANY.

**L11.35**  
SPECTROSCOPIC CHARACTERIZATION OF ION-IMPLANTED GaN. B.J. Skromme and L. Chen, Dept of Electrical Engineering and Center for Solid State Electronics Research, Arizona State Univ, Tempe, AZ.

**L11.36**  
CATHODOLUMINESCENCE CHARACTERIZATION OF ION IMPLANTED AlN. J. Zenneck, U. Vetter, H. Hofsäss, and C. Ronning, II. Physikalisches Institut, Universität Göttingen, Göttingen, GERMANY.

**L11.37**  
PHOTOCONDUCTIVITY OF GaN FILMS PRODUCED BY MBE AND MOCVD. C. Thomidis, A. Battacharyya, and T.D. Moustakas, Boston University, Electrical and Computer Engineering and Center for Photonics Research, Boston, MA.

**L11.38**  
PLANE-WAVE PSEUDOPOTENTIAL STUDY ON MECHANICAL AND ELECTRONIC PROPERTIES FOR GROUP III-V SEMICONDUCTORS. S.Q. Wang, H.Q. Ye, Shenyang National Laboratory for Materials Science, Institute of Metal Research, Chinese Academy of Sciences, Shenyang, P.R. CHINA.

**L11.39**  
USE OF MECHANICAL BENDING FOR DETERMINATION OF DEFORMATION POTENTIALS FOR THE E<sub>2</sub>(high) PHONON MODE OF AlN. A. Sarua and M. Kuball, Physics Department, University of Bristol, Bristol, UNITED KINGDOM; J.E. Van Nostrand, Air Force Research Laboratory, Wright-Patterson Air Force Base, OH.

**L11.40**  
SURFACE PASSIVATION OF AlGaIn TERMINATED AND GaN TERMINATED HEMT STRUCTURES. B.P. Gila, E. Lambers, A.H. Onstine, K.K. Allums, C.R. Abernathy, S.J. Pearton, University of Florida, Dept of Materials Science and Engineering, Gainesville, FL; B. Luo, F. Ren, University of Florida, Dept of Chemical Engineering, Gainesville, FL.

**L11.41**  
FABRICATION OF AlGaIn/GaN HETEROSTRUCTURE FIELD EFFECT TRANSISTOR USING PRE-OXIDATION PROCESS. C.M. Jeon, H.W. Jang, Jae-Hoon Lee<sup>a</sup>, Jung-Hee Lee<sup>a</sup>, J-L. Lee, Department of Materials Science and Engineering, Pohang University of Science and Engineering, Pohang, KOREA; <sup>a</sup>Department of Electronic and Electrical Engineering, Kyunpook National University, Teagu, KOREA.

**L11.42**  
NOVEL GaN-BASED TRANSISTOR GEOMETRY FABRICATED BY PHOTOELECTROCHEMICAL WET UNDERCUT ETCHING. Yan Gao<sup>a</sup>, Andreas R. Stonas<sup>b</sup>, Ilan Ben-Yaacov<sup>b</sup>, Umesh Mishra<sup>b</sup>, Steve P. DenBaars<sup>a,b</sup>, Evelyn L. Hu<sup>a,b</sup>; <sup>a</sup>Materials Dept., University of California, Santa Barbara, CA; <sup>b</sup>Electrical and Computer Engineering Dept., University of California, Santa Barbara, CA.

**L11.43**  
INVESTIGATION OF SPACER AND N-TYPE LAYER OF DOPED HEMT STRUCTURES USING STATISTICAL MULTI-PARAMETER SOFTWARE EVALUATIONS. A. Alam, B. Schineller, M. Bremser, M. Heuken and H. Juergensen, AIXTRON AG, GERMANY; H. Hardtdegen, N. Nastase, H. Bay, M. Kocan, R. Schmidt, P. Kordoš and H. Lueth, Institute of Thin Film and Interfaces (ISG), Forschungszentrum Juelich, Juelich, GERMANY.

**L11.44**  
PROPERTIES OF DELTA DOPED Al<sub>0.25</sub>Ga<sub>0.75</sub>N AND GaN EPITAXIAL LAYERS. J.S. Flynn, L.G. Wallace, J.A. Dion, E.L. Hutchins, H. Antunes and G.R. Brandes, ATMI, Danbury, CT.

**L11.45**  
AlGaIn/GaN HFETS FOR AUTOMOTIVE APPLICATIONS. Ronald Birkhahn, David Gotthold, Nathan Cauffman, Boris Peres, EMCORE Corporation, Somerset, NJ; Seikoh Yoshida, The Furukawa Electric Co., Okano, Nishi-ku, Yokohama, JAPAN.

**L11.46**  
LOW FREQUENCY NOISE IN AlGaIn/InGaIn/GaN DOUBLE HETEROSTRUCTURE FIELD-EFFECT TRANSISTORS. Nezhil Pala, Sergey Rummyantsev, Michael Shur, Rensselaer Polytechnic Inst, Dept of Electrical, Computer, and Systems Engineering, Troy, NY; Remis Gaska, Xuhong Hu, Sensor Electronic Technology, Inc., Latham, NY; Jinwei Yang, Grigory Simin, Asif M. Khan, Univ of South Carolina, Dept of Electrical and Computer Engineering, Columbia, SC.

**L11.47**

SUBBAND ELECTRON PROPERTIES OF MODULATION-DOPED  $Al_xGa_{1-x}N/GaN$  HETEROSTRUCTURES. D.R. Hang, C.F. Huang, Y.H. Chang, Y.F. Chen, National Taiwan Univ., Dept. of Physics, Taipei, TAIWAN; B. Shen, Nanjing University, National Laboratory of Solid State Microstructures and Dept. of Physics, Nanjing, CHINA.

**L11.48**

PHOTOREFLECTANCE AND PHOTOLUMINESCENCE OF A TWO-DIMENSIONAL ELECTRON GAS AT A GaN/AlGaN HETEROINTERFACE. Tomasz J. Ochalski, Lukasz Macht, Andrzej Grzegorzczak, Paul R. Hageman, Poul K. Larsen, Experimental Solid State Physic III, RIM, University of Nijmegen, Nijmegen, THE NETHERLANDS; Anna Wojcik, Tomasz Piwonski, Maciej Bugajski, Institute of Electron Technology, Warsaw, POLAND.

**L11.49**

MONTE-CARLO SIMULATION OF SCATTERING ELECTRON TRANSPORT MECHANISMS IN GaN. Alexander Tamelo, Vladimir Muravév, Valery Mishenko, Dept of Radioelectronics, Minsk, BELARUS.

**L11.50**

ELECTRICAL AND STRUCTURAL CHARACTERIZATION OF METAL CONTACTS ON GALLIUM NITRIDE. Annalisa Bonfiglio, Elisabetta Macis, Giovanna Mura, Univ of Cagliari, Cagliari, ITALY.

**L11.51**

A STRUCTURAL ANALYSIS OF THE Pd/GaN OHMIC CONTACT ANNEALING BEHAVIOR. P. Ruterana, ESCM-CRISMAT, UMR6508-CNRS, ISMRA Caen, FRANCE; C.C. Kim, Y.B. Kwon, J.H. Je, Synchrotron Xrays Laboratory, Department of Materials Science and Engineering, Pohang University, Pohang, SOUTH KOREA.

**L11.52**

SYNCHROTRON PHOTOEMISSION STUDY OF OXIDIZED Ni/Au CONTACT ON p-TYPE GaN. Ho Won Jang, Chang Min Jeon, Jong-Lam Lee, Dept of Materials Science and Engineering, Pohang University of Science and Engineering (POSTECH), Pohang, KOREA.

**L11.53**

EFFECTS OF SURFACE TREATMENT USING THIOACETAMIDE SOLUTIONS ON Pt/Au OHMIC CONTACTS TO P-TYPE GaN. Suk-Ho Cho, June-O. Song, and Tae-Yeon Seong, Kwangju Institute of Science & Technology, Dept of Materials Science & Engineering, Kwangju, KOREA.

**L11.54**

Ti/Al- GaN INTERFACE ANALYSIS FOR LOW CONTACT RESISTANCE FORMATION. Yoshimichi Fukasawa, Tomonori Nakamura, Tohru Nakamura, College of Engineering, Hosei University, Tokyo, JAPAN.

**L11.55**

COMPARATIVE MORPHOLOGY OF AuTiAlTi, AuPdAlTi AND AuAlTi OHMIC CONTACTS TO AlGaN/GaN. M.W. Fay, G. Moldovan, P.D. Brown, School of Mechanical, Materials, Manufacturing Engineering and Management, University of Nottingham, Nottingham, UNITED KINGDOM; I. Harrison, School of Electrical and Electronic Engineering, University of Nottingham, Nottingham, UNITED KINGDOM; R.S. Balmer, K.P. Hilton, B.T. Hughes, M.J. Uren, T. Martin, QinetiQ Ltd, Malvern, Worcs, UNITED KINGDOM.

**L11.56**

THERMAL STABILITY OF TaN SCHOTTKY CONTACTS ON n-GaN. J.R. Hayes, D.W. Kim, H. Meidia, S. Mahajan, Arizona State University, Dept. of Chemical and Materials Engineering, Tempe, AZ.

**L11.57**

STABLE OHMIC CONTACTS ON GaAs AND GaN DEVICES FOR HIGH TEMPERATURES. A. Piotrowska, E. Kaminska, K. Golaszewska, H. Wrzesinska, T.T. Piotrowski, Institute of Electron Technology, Warsaw, POLAND; A. Barcz, E. Dynowska, R. Jakiela, A. Wawro, Institute of Physics PAS, Warsaw, POLAND.

**L11.58**

OHMIC AND RECTIFYING CONTACTS TO N AND P-TYPE GaN FILMS. H. Hall, M. Awaah, A. Kumah, K. Das, Tuskegee University, Dept. of Electrical Engineering, Tuskegee, AL; F. Semendy, Army Research Laboratory, Adelphi, MD.

**L11.59**

ACTIVATION AND PASSIVATION OF Mg ACCEPTOR IN

GaN:Mg. D. Matlock, M.E. Zvanut, Department of Physics, University of Alabama at Birmingham, Birmingham, AL; Jeffrey R. DiMaio, R.F. Davis, Department of Materials Science and Engineering, NCSU, Raleigh, NC; J.E. Van Nostrand, Materials and Manufacturing Directorate, AFRL, WPAFB, OH; R.L. Henry, NRL, Washington, DC; Daniel Koleske, Sandia National Laboratories, Albuquerque, NM; Alma Wickenden, U.S. Army Research Laboratory, Adelphi, MD.

**L11.60**

MICROSTRUCTURAL DEFECTS IN Mg-DOPED AlGaN LAYERS GROWN BY METALORGANIC CHEMICAL VAPOR DEPOSITION. Hyung Koun Cho, Dong-A University, Dept of Metallurgical Engineering, Busan, KOREA; Gye Mo Yang, Chonbuk National University, Dept of Semiconductor Science & Technology, Chunju, KOREA.

SESSION L12: CONTACTS, PROCESSING, AND p-TYPE NITRIDES  
Chair: David C. Look  
Friday Morning, December 6, 2002  
Room 302 (Hynes)

**8:30 AM \*L12.1**

ISSUES OF PREPARING OHMIC CONTACT MATERIALS FOR p-GaN. Masanori Murakami, Yasuo Koide, Miki Moriyama, Department of Materials Science and Engineering, Kyoto University, Kyoto, JAPAN.

**9:00 AM L12.2**

OHMIC CONTACTS TO HIGH ALUMINUM FRACTION P-TYPE AlGaIn. Brett A. Hull, Suzanne E. Mohny, Pennsylvania State University, Dept. of Materials Science and Engineering, University Park, PA; Uttiya Chowdhury, Russell D. Dupuis, University of Texas at Austin, Dept. of Electrical and Computer Engineering, Austin, TX.

**9:15 AM L12.3**

BURIED STRESSORS IN NITRIDE SEMICONDUCTORS: INFLUENCE ON ELECTRONIC PROPERTIES. P. Waltereit, A.E. Romanov<sup>a</sup>, and J.S. Speck, Materials Dept., University of California, Santa Barbara, CA. <sup>a</sup>also, Ioffe Institute, St. Petersburg, RUSSIA.

**9:30 AM L12.4**

GaN MICRODISK FABRICATION USING PHOTO-ELECTROCHEMICAL ETCHING. E.D. Haberer, A. Stonas<sup>a</sup>, Y. Gao, S. DenBaars, E.L. Hu<sup>a</sup>, Materials Department, University of California, Santa Barbara, CA; <sup>a</sup>Dept. of Elect. and Comp. Eng., University of California, Santa Barbara, CA.

**9:45 AM L12.5**

ION SENSITIVE FIELD EFFECT TRANSISTORS BASED ON AlGaIn/GaN HETEROSTRUCTURES. Martin Eickhoff, Georg Steinhoff, Martin Hermann, Martin Stutzmann, Walter Schottky Institute, Technical University Munich, Munich, GERMANY.

**10:00 AM BREAK****10:30 AM \*L12.6**

SUBSTITUTIONAL AND INTERSTITIAL CARBON IN WURTZITE GALLIUM NITRIDE. A.F. Wright and C.H. Seager, Sandia National Laboratories, Albuquerque, NM; J. Yu and W. Goetz, Lumileds Lighting, San Jose, CA.

**11:00 AM L12.7**

STRUCTURAL DEFECTS IN Mg DOPED GaN AND AlGaIn GROWN BY MOCVD. S. Tomiya, Material Analysis Dept., Technical Solutions Center, Sony Corporation, Yokohama, JAPAN; S. Goto, M. Takeya, M. Ikeda, Sony Shiroishi Semiconductor Inc., Miyagi, JAPAN.

**11:15 AM L12.8**

INFLUENCE OF AMBIENT ON SURFACE-INHIBITED H RELEASE FROM p-GaN. S.M. Myers, W.R. Wampler, C.H. Seager, B.L. Vaandrager, D.D. Koleske, A.A. Allerman, Sandia National Laboratories, Albuquerque, NM; J.S. Nelson, Uniroyal Optoelectronics, Tampa, FL.

**11:30 AM L12.9**

MEASUREMENTS AND MODELING OF H DIFFUSION IN P-TYPE GaN. C.H. Seager, S.M. Myers, A.F. Wright, D.D. Koleske, A.A. Allerman, Sandia National Laboratories, Albuquerque, NM.

**11:45 AM L12.10**

A WAFER-FUSED N-AlGaAs/P-GaAs/N-GaN HETEROJUNCTION BIPOLAR TRANSISTOR(HBT). Sarah Estrada, Andrew Huntington, Andreas Stonas, Larry Coldren, Steven DenBaars, Umesh

Mishra, Evelyn Hu, Depts of Materials and Electrical & Computer Engineering, University of California, Santa Barbara, CA; Jacek Jasinski, Zuzanna Liliental-Weber, Materials Science Division, Lawrence Berkeley National Laboratory, Berkeley, CA.