



Strasbourg (France)

E-MRS Spring Meeting 2004
May 24-28, 2004

SYMPOSIUM M

Dilute nitride and related mismatched
semiconductor alloys

Symposium Organizers:

Eoin O'Reilly, NMRC, Cork, Ireland

Naci Balkan, University of Essex, U.K.

Henning Riechert, Infineon Technologies, München, Germany

Irina Buyanova, University of Linköping, Sweden

Xavier Marie, LPMC, Toulouse, France

E-MRS 2004 SPRING MEETING

SYMPOSIUM M

Tuesday, May 25, 2004

Morning

Session I : Growth 1

Session Chair: James Harris

- M-I.01** 09:00 -Invited- EPITAXY AND CHARACTERIZATION OF DILUTE III-As_{1-y}N_y ON GaAs AND InP
K. Köhler, J. Wagner, P. Ganser, D. Serries, T. Geppert, M. Maier and L. Kirste, Fraunhofer Institut für Angewandte Festkörperphysik, Tullastrasse 72, 79108 Freiburg, Germany
- M-I.02** 09:40 ELECTRON SPECTROSCOPY OF GaNAs ALLOYS
C.F. McConville, I. Mahboob and T.D. Veal, Department of Physics, University of Warwick, Coventry CV4 7AL, U.K., **M. Hopkinson**, Department of Electronic and Electrical Engineering, University of Sheffield, Mappin Street, Sheffield S1 3JD, U.K.
- M-I.03** 10:00 EFFECTS OF ELECTRON IRRADIATION ON PHOTOLUMINESCENCE FROM GaInNAs/GaAs MULTIQUANTUM WELLS SUBJECT TO THERMAL ANNEALING
E.-M. Pavelescu(a), **M. Dumitrescu**(a), **A. Gheorghiu**(b), **R. Kudrawiec**(c), **J. Misiewicz**(c), **N. Tkachenko**(d), **V.D.S. Dhaka**(d), **H. Lemmetyinen**(d), **T. Jouhti**(a), and **M. Pessa**(a), (a)Optoelectronics Research Centre, Tampere University of Technology, P.O.Box 692, 33101 Tampere, Finland, (b)Hyperion University, Calea Calarasi 169, 74118 Bucuresti, Romania, (c)Institute of Physics, Wroclaw University of Technology Wybrzeze Wyspiaskiego 27, 50-370 Wroclaw, Poland, (d)Institute of Materials Chemistry, Tampere University of Technology, P.O. Box 541, 33101 Tampere, Finland
- 10:20 **BREAK**

Session II: Growth 2

Session Chair: Henning Riechert

- M-II.01** 10:40 -Invited- MOVPE GROWTH OF DILUTE NITRIDES ON GaAs AND InP SUBSTRATES FOR DEVICE APPLICATIONS
F. Alexandre, ALCATEL Research & Innovation, OPTO+, route de Nozay, 91460 Marcoussis, France
- M-II.02** 11:20 IMPROVING OPTICAL PROPERTIES OF 1550 nm GaInNAs/GaAs MULTIPLE QUANTUM WELLS BY GaInNAs QUATERNARY BARRIER AND SPACER LAYER
H.Y. Liu, **M. Hopkinson**, **P. Navaretti**, **M. Gutierrez**, **J.S. Ng** and **J.P.R. David**, Department of Electronic & Electrical Engineering, EPSRC National Centre for III-V Technologies, University of Sheffield, Sheffield S1 3JD, U.K., **H.D. Sun**, **A.H. Clark**, **M.D. Dawson**, Institute of Photonics, University of Strathclyde, 106 Rottenrow, Glasgow, G4 0NW, U.K.
- M-II.03** 11:40 GROWTH OF GaN_xAs_{1-x} ATOMIC MONOLAYERS (x < 0.1) AND THEIR INSERTION IN THE VICINITY OF GaInAs QWs
M. Le Dû, **J.C. Harmand**, **K. Meunier**, Laboratoire de Photonique et de Nanostructures, Route de Nozay, 91460 Marcoussis, France
- 12:00 **LUNCH**

Tuesday, May 25, 2004

Afternoon

Session III: Structure

Session Chair: Wladek Walukiewicz

- M-III.01** 14:00 -Invited- COMPOSITIONAL FLUCTUATIONS AND OPTICAL PROPERTIES OF InGaAsN QUANTUM WELLS ANALYSED BY TRANSMISSION ELECTRON MICROSCOPY
M. Albrecht, T. Remmele, H.P. Strunk, University of Erlangen-Nuremberg, Department of Materials Science and Engineering, Institute of Microcharacterisation, Cauerstr. 6, 91058 Erlangen, Germany, L. Geelhaar, Gh. Dumitras, H. Riechert, Infineon Technologies, Corporate Research Photonics, 81730 München, Germany
- M-III.02** 14:40 NITROGEN INCORPORATION INTO DILUTE GaAsN ALLOYS
M. Reason, H. McKay, X. Weng, N. Rudawski, and R.S. Goldman, Department of Materials Science and Engineering, University of Michigan, Ann Arbor MI 48109-2136, USA, V. Rotberg, Department of Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor MI 48109, USA
- M-III.03** 15:00 DETECTION OF STRAIN FIELDS IN METASTABLE (GaIn)(NAs) INVESTIGATED BY DARK FIELD TEM
T. Torunski, W. Stolz and K. Volz, Materials Sciences Centre, Central Technology Lab., Philipps University Marburg, Hans-Meerwein Strasse, 35032 Marburg, Germany
- M-III.04** 15:20 FURTHER INSIGHT INTO THE GROWTH TEMPERATURE INFLUENCE OF 1.3 μ m GaInNAs/GaAs QWS ON THEIR PROPERTIES
D. Jahan, G. Patriarche, V. Sallet, J.C. Harmand, LPN-CNRS, Route De Nozay, 91460 Marcoussis, France
- 15:40 **BREAK**

Session IV: Defects 1

Session Chair: Irina Buyanova

- M-IV.01** 16:00 -Invited- THE PHYSICS OF DEFECTS AND HYDROGEN IN DILUTE NITRIDES
S.B. Zhang, National Renewable Energy Laboratory, Golden CO 80401, USA
- M-IV.02** 16:40 MUTUAL PASSIVATION EFFECTS IN HIGHLY MISMATCHED GROUP III-V-N ALLOYS
J. Wu, K.M. Yu and W. Walukiewicz, Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley CA 94720, USA
- M-IV.03** 17:00 CARRIER RECOMBINATION PROCESSES IN (In)GaAsN: FROM THE DILUTE LIMIT TO ALLOYING
R. Intartaglia, T. Taliercio, P. Valvin, P. Lefebvre, T. Bretagnon, T. Guillet, B. Gil, Groupe d'Etude des Semiconducteurs, UMR5650 CNRS-Université Montpellier II, CC074, 34095 Montpellier Cedex 5, France, M.A. Pinault, Centre de Recherche sur l'Hétéro-Epitaxie et ses Applications, Centre National de la Recherche Scientifique (CRHEA/CNRS), Rue Bernard Grégory, Parc Sophia Antipolis, 06560 Valbonne, France, E. Tournie, CEM2 CNRS UMR 5507, Université Montpellier II, CC067, 34095 Montpellier Cedex 5, France
- M-IV.04** 17:20 THERMAL ANNEALING EFFECT ON 1.3 μ m GaInNAs/GaAs QUANTUM WELL STRUCTURES CAPPED WITH DIELECTRIC FILMS
Hongfei Liu, Changsi Peng, Tomi Jouhti, Suvi Karirinne, Janne Konttinen, and Markus Pessa, Optoelectronic Research Center, Tampere University of Technology, P.O. Box 692, Tampere 33101, Finland

Wednesday, May 26, 2004

Afternoon

Session V : Devices

Session Chair: François Alexandre

- M-V.01** 14:00 -Invited- GaInNAs(Sb) LONG WAVELENGTH COMMUNICATIONS LASERS
James Harris, Department of Electrical Engineering, Stanford University, Stanford, CA 94305, USA
- M-V.02** 14:40 HIGH FREQUENCY PERFORMANCE OF 3-QUANTUM WELL GaInNAs/GaAs RIDGE WAVEGUIDE LASERS EMITTING AT 1.35 μm
A. Martínez, V. Sallet, D. Jahan, L. Ferlazzo, J.-C. Harmand, A. Ramdane, CNRS-Laboratoire de Photonique et de Nanostructures, Route de Nozay, 91460 Marcoussis, France and J.-G. Provost, J. Landreau, O. Le Gouezigou, B. Dagens, ALCATEL/ OPTO+, Route de Nozay, 91460 Marcoussis, France
- M-V.03** 15:00 INFLUENCE OF GROWTH CONDITIONS ON CARRIER RECOMBINATION IN GaInNAs-BASED LASERS
R. Fehse(a), S.J. Sweeney(a), A.R. Adams(a), D. McConville(a), L. Geelhaar(b), H. Riechert(b), (a)Advanced Technology Institute, University of Surrey, Guildford, Surrey GU2 7XH, U.K., (b)Infineon Technologies AG, Corporate Research, 81730 Munich, Germany
- M-V.04** 15:20 GaInNAs SESAMS PASSIVELY MODE-LOCKING 1.3- μm SOLID-STATE LASERS
V. Liverini, S. Schön, R. Grange, M. Haiml, S. Zeller, U. Keller, ETH Zurich, Switzerland
- 15:40 **BREAK**
- 16:00 – 18:30 POSTER SESSION

Thursday, May 27, 2004

Morning

Session VI: Band structure

Session Chair: Shengbai Zhang

- M-VI.01** 09:00 -Invited- DILUTE GaAsN: AN "UNUSUAL" ALLOY BAND STRUCTURE PROBED BY MAGNETO-TUNNELLING SPECTROSCOPY
A. Patanè, J. Endicott, J. Ibáñez, L. Eaves, School of Physics and Astronomy, University of Nottingham, Nottingham NG7 2RD, U.K., M. Hopkinson, R. Airey, and G. Hill, Dept. of Electronic and Electrical Engineering, University of Sheffield, S3 3JD Sheffield, U.K.
- M-VI.02** 09:40 MAGNETOPHOTOLUMINESCENCE STUDIES OF $\text{In}_x\text{Ga}_{1-x}\text{As}_{1-y}\text{N}_y$: A MEASUREMENT OF THE ELECTRON EFFECTIVE MASS, EXCITON SIZE, AND CARRIER LOCALIZATION DEGREE
A. Polimeni, F. Masia, G. Baldassarri Höger von Högersthal, F. Mari, A. Frova, and M. Capizzi, INFN-Dipartimento di Fisica, Università di Roma "La Sapienza", P.le A. Moro 2, 00185 Roma, Italy, P.J. Klar and W. Stolz, Department of Physics and Material Sciences Center, Philipps-University, Renthof 5, 35032 Marburg, Germany
- M-VI.03** 10:00 BOUNDARY CONDITIONS FOR THE ELECTRON WAVE FUNCTION IN GaInNAs-BASED QUANTUM WELLS AND MODELLING OF THE TEMPERATURE-DEPENDENT BAND GAP
M. Hetterich(a), A. Grau(a), A.Yu. Egorov(b) and H. Riechert(b), (a)Institut für Angewandte Physik and Center for Functional Nanostructures (CFN), Universität Karlsruhe (TH), 76131 Karlsruhe, Germany, (b)Infineon Technologies, 81730 München, Germany
- 10:20 **BREAK**

Session VII: Electronic disorder

Session Chair: Naci Balkan

- M-VII.01** 10:40 -Invited- EXCITON LOCALIZATION IN InGaAsN AND GaAsSbN OBSERVED BY NEAR-FIELD MAGNETOLUMINESCENCE AND SCANNING OPTICAL MICROSCOPY (NSOM)
James L. Merz, Alexander M. Mintairov, and Thomas Kosel, Department of Electrical Engineering, University of Notre Dame, Notre Dame IN 46556, USA, Victor M. Ustinov, Ioffe Physico-Technical Institute, St. Petersburg, Russia, Gregory Peake, Sandia National Laboratory, Albuquerque NM 87185, USA
- M-VII.02** 11:20 MAGNETOTRANSPORT IN DOPED GaAsN AND GaInNAs LAYERS
Jörg Teubert, **Peter J. Klar**, Wolfram Heimbrodt, Peter Thomas, Kerstin Volz, Wolfgang Stolz, Dept. Physics and Materials Science Center, Philipps-University Marburg, Renthof 5, 35032 Marburg, Germany
- M-VII.03** 11:40 INTRINSIC LIMITS ON ELECTRON MOBILITY IN DISORDERED DILUTE NITRIDE SEMICONDUCTOR ALLOYS
S. Fahy, Department of Physics and NMRC, University College Cork, Ireland, A. Lindsay and E.P. O'Reilly, NMRC, University College, Lee Maltings, Prospect Row, Cork, Ireland
- 12:00 **LUNCH**

Thursday, May 27, 2004

Afternoon

Session VIII: Mismatched alloys

Session Chair: Xavier Marie

- M-VIII.01** 14:00 -Invited- SYNTHESIS AND PROPERTIES OF HIGHLY MISMATCHED II-O-VI ALLOYS
K. M. Yu(a), **W. Walukiewicz**(a), M.A. Scarpulla(a,b), O.D. Dubon(a,b), W. Shan(a), J. Wu(a), J.W. Beeman(a) and P. Becla(c), (a)Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley CA 94720, USA, (b)Materials Sciences Division, Lawrence Berkeley National Laboratory, and Department of Materials Science and Engineering, University of California, Berkeley CA 94720, USA, (c)Department of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge MA 02139, USA
- M-VIII.02** 14:40 ORIGIN OF BANDGAP BOWING IN GaNP ALLOYS
I.A. Buyanova, M. Izadifard, W.M. Chen, Department of Physics and Measurement Technology, Linköping University, 581 83 Linköping, Sweden, and H.P. Xin, C.W. Tu, Department of Electrical and Computer Engineering, University of California, La Jolla, USA
- M-VIII.03** 15:00 EFFECT OF LATTICE IONICITY ON HYDROGEN ACTIVITY IN II-VI MATERIALS CONTAINING ISOELECTRONIC OXYGEN IMPURITIES
A. Polimeni, M. Felici, V. Cesari, A. Fropa and M. Capizzi, INFN-Dipartimento di Fisica, Università di Roma "La Sapienza", P.le A. Moro 2, 00185 Roma, Italy, Y. Nabetani, Y. Ito, T. Okuno, T. Kato, T. Matsumoto and T. Hirai Department of Electrical and Electronic Engineering, University of Yamanashi, Takeda 4-3-11, Kofu 400-8511, Japan, Yong Dae Choi, Department of Physics, Mokwon University, Taejon 302-729, Korea, Byung-sung O and Young-Moon Yu, Department of Physics, Chungnam National University, Taejon 305-764, Korea, I.K. Sou, W.K. Ge, Department of Physics, The Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong, China
- 15:20 **BREAK**

Session IX: Defects 2

Session Chair: Eoin O'Reilly

- M-IX.01** 16:00 -Invited- DEFECTS IN DILUTE NITRIDES: SIGNIFICANCE AND EXPERIMENTAL SIGNATURES
W.M. Chen and I.A. Buyanova, Department of Physics and Measurement Technology, Linköping University, 581 83 Linköping, Sweden
- M-IX.02** 16:40 C INCORPORATION IN (GaIn)(NAs) AND ITS DEPENDENCE ON GROWTH CONDITIONS AND INFLUENCE ON LASING CHARACTERISTICS
K. Volz, S. Nau, B. Kunert, S. Reinhard, W. Stolz, Material Sciences Center - Central Technology Laboratory, Philipps University Marburg, 35032 Marburg, Germany
- M-IX.03** 17:00 EFFECT OF FAST THERMAL ANNEALING ON THE OPTICAL SPECTROSCOPY IN MBE AND CBE GROWN GaInNAs/GaAs QWS: BLUE SHIFT VERSUS RED SHIFT
N. Balkan(a), S. Mazzucato(b), A. Erol(c), C.J. Hepburn(a), R.J. Potter(d), A. Boland-Thoms(a), A.J. Vickers(a), (a)University of Essex, Department of Electronic Systems Engineering, Colchester, Essex CO4 3SQ, U.K., (b)Dipartimento di Fisica, Università degli Studi di Roma "La Sapienza", Piazzale Aldo Moro 2, 00185 Roma, Italy, (c)Istanbul University, Department of Physics, 34459 Vezneciler, Istanbul, Turkey, (d)University of Liverpool, Department Material Science & Engineering, Liverpool L69 3BX, U.K.