

2012 Conference on Optoelectronic and Microelectronic Materials & Devices

(COMMAD 2012)

**Melbourne, Australia
12 – 14 December 2012**



IEEE Catalog Number: CFP12763-PRT
ISBN: 978-1-4673-3047-3

Table of Contents

Program.....	iii
Preface.....	xv
Scientific Advisory Committee and Organising Committee.....	xvii
List of Invited Speakers.& Public Lecture Speaker.....	xviii
Sponsors/Supports.....	xx
Table of Content.....	xxi
Technical Papers.....	3
Author Index.....	225

Wednesday, 12 December 2012

Quantum integrated photonics on GaAs.....	3
S. Höfling, M. Lerner, J. Beetz, T. B. Hoang, J. P. Sprengers, A. Gaggero, D. Sahin, L. Midolo, M Skacel, L. Balet, P. Jiang, S. Jahanmirinejad, G. Frucci, N. Chauvin, F. Mattioli, R. Sanjines, R. Leoni, E. Engin ,M. G. Thompson, J. L. O'Brien, A. Fiore, M. Kamp	
Vertical transport in InAs/GaSb type-II superlattices.....	5
G. A. Umana Membreno, B. Klein, H. Kala, J. Antoszewski, G. Gautam, M.N. Kuttly, E. Plis, S. Krishna, L. Faraone	
Effects of Au catalyst on GaAs (111) _B surface during annealing.....	7
Z. M. Liao, H. Y. Xu, W. Sun, Y. N. Guo, L. Yang, Z. G. Chen, J. Zou, Z. Y. Lu, P. P. Chen, and W. Lu	
The origin of gate hysteresis in p-type Si-doped AlGaAs/GaAs heterostructures.....	9
D. Carrad, A. M. Burke, D. Waddington, R. Lyttleton, H. H. Tan, P. J. Reece, O. Klochan, A. R. Hamilton, A. Rai, D. Reuter, A. D. Wieck, and A. P. Micolich	
Light trapping and solar energy harvesting in thin film photonic crystals.....	11
S. John	
Structural characteristics of GeMn diluted magnetic semiconductor nanostructures.....	13
J. Zou, Y. Wang, F. Xiu, Z. Zhao, K. L. Wang	
A comparison of InGaAs and Ge photonic power converters for long wavelength power over fibre.....	15
G. A. Allwood, G. Wild, and S. Hinckley	
Optical waveguides realised in z-cut, 5 mol% Mg-doped, congruent LiNbO ₃ using etching during indiffusion of Ti.....	17
T. Crasto, H. Steigerwald, V. Sivan and A. Mitchell	
Scaling FETs to (beyond?) 10nm: From semiclassical to quantum models.....	19
M. V. Fischetti, S. J. Aboud, J. Kim, Z. Y. Ong and S. Narayanan	
3D hybrid CMOS/Memristor circuits: Basic principle and prospective applications.....	21
D. B. Strukov	
Broadband near-infrared emission from bismuth doped silicon oxide films prepared by ion-implantation.....	23
M. P. Halsall, I. F. Crowe, R. Southern, P. Yang and R. M. Gwilliam	
Optical switching and photoluminescence in Erbium implanted vanadium dioxide thin films.....	25
H. Lim, J. C. McCallum, N. Stavrias, R. E. Marvel and R. F. Haglund	
Nanowires for solar cell applications.....	27
Fontcuberta i Morral	
PL mapping and optimised optical trapping of nanowires SLM beam shaping.....	29
F. Wang, W. M. Lee, W. J. Toe, Q. Gao, H. H. Tan, C. Jagadish and P. J. Reece	

Growth of defect-free InAs nanowires using Pd catalyst.....	31
H. Y. Xu, Y.N. Guo, Z.M. Liao, J. Zou, Q. Gao, H. H.Tan, and C. Jagadish	
Improvement of Minority carrier lifetime in GaAs/AlGaAs core-shell nanowires.....	33
J. Niang, P. Parkinson, Q. Gao, J. Wong-Leung, S. Breuer, H. H. Tan, C. Jagadish	
Influence of growth temperature and V/III ratio on Au-assisted InGaAs nanowires.....	37
A. S. Ameruddin, H. H. Tan, H. A. Fonseka, Q. Gao, J. Wong-Leung, P. Parkinson, S.Breuer and C. Jagadish	
MOCVD growth of GaAs nanowires using Ga droplets.....	39
S. Breuer, F. Karouta, H. H. Tan and C. Jagadish	
Quantification of the Zinc dopant concentration in GaAs nanowires.....	41
T. Burgess, S. Du, B. Gault, Q. Gao, H. H. Tan, R. Zheng and C. Jagadish	
Growth of InP nanowires on Silicon using a thin buffer layer.....	43
A. Fonseka, H. H. Tan, J.H. Kang, S. Paiman, Q. Gao, P. Parkinson and C. Jagadish	
InP nanowires grown by SA-MOVPE.....	45
Q. Gao, H. H.Tan, L. Fu, P. Parkinson, S. Breuer, J. Wong-Leung and C. Jagadish	
Effect of plasmonic nanoparticles on the quantum efficiency of III-V semiconductor nanowire emitters.....	47
S. Mokkalpati, D. Saxena, Q. Gao, H. H. Tan and C. Jagadish	
Progress Towards Opto-Electronic Characterization of Indium Phosphide Nanowire Transistors at milli-Kelvin temperatures.....	49
L. Willems van Beveren, J. C. McCallum, H. H. Tan and C. Jagadish	
Shell formation in InGaAs nanowires driven by lattice latching and polarity effect.....	51
Y. Guo, J. Zou, T. Burgess, Q. Gao, H. H. Tan and C. Jagadish	
Droplet epitaxy of strain-free GaAs/AlGaAs quantum molecules for optoelectronic applications.....	53
W. Lei, P. Parkinson, H. H. Tan and C. Jagadish	
The influence of small-angle scattering on ballistic transport in quantum dots.....	55
A. M. See, I. Pilgrim, B. C. Scannell, R. Montgomery, O. Klochan, A. M. Burke, M. Aagesen, P. E. Lindelof, I. Farrer, D. A. Ritchie, A. R. Hamilton, R. P. Taylor, and A. P. Micolich	
The 1D g-factor and 0.7 anomaly in QPCs with independent control over density.....	57
A. Burke, O. Klochan, A. R. Hamilton, I. Farrer, D. A. Ritchie and A. P. Micolich	
Diffusion and population dynamics of excitons in c-axis grown ZnO quantum wells.....	59
C. R. Hall, G. Richards, J. Tollerud, H. H. Tan, C. Jagadish, K. Koike, S. Sasa, M. Inoue, M. Yano and J.A. Davis,	
RF magnetron sputtered molybdenum back contact for Cu ₂ ZnSnS ₄ thin solar cells.....	61
X. Liu, X. Hao, M. A. Green, S. Huang, G. Conibeer.	
A Metamaterial Antenna Approach to Near Infra-Red Polarisation State Control.....	63
J. Cadusch, T. D. James, T. Davis and A. Roberts	
Non-equivalent Zigzag edge stresses for 2D binary compound.....	65
J. Deng, J.Z. Liu, and N. V. Medhekar	
Study of uniformly doped graphene nanoribbon transistor (GN) FET using quantum simulation.....	67
N. D. Akhavan, G Jolley, G Umana Membreno, J Antoszewski, L.Faraone	

Optical read-out scheme based on grating waveguide cantilever cavity resonance for interrogation of cantilever sensor arrays.....	69
P. Prakash, M. Renilkumar, C. Venkatesh, L. Faraone, G.A. Umama-Membreno, K.K.M.B. D. Silva, A. Keating, M. Martyniuk, J. M. Dell, M. M Varma, N. Bhat and R. Pratap	
Tailor-made domain structures on the x-face and y-face of LiNbO ₃ crystal.....	71
A. Boes, H. Steigerwald, T. Crasto, V. Sivan, S. Wade, and A. Mitchell	
Tailor anchor shape during release of MEMS microbeams using microfluidic flow.....	73
B. Cheah, A.J. Keating, and J.M. Dell	
Detection of biological reactions by AlGaIn/GaN biosensor.....	75
A. Podolska, R. M. Seeber, U. K. Mishra, K. D. G. Pflieger, G. Parish and B. D. Nener	
Ion-implantation and analysis for doped silicon slot waveguides.....	77
L. Deam, N. Stavris, K. K. Lee and J. C. McCallum	
Comparison of the RF characteristics of inversion channel and depletion channel SOS MOSFETs.....	79
K. Bertling, A. D. Rakić, Y. T. Yeow, C. J. O'Brien, and H. Domyo	
Towards a scanning laser confocal microscope using the self-mixing effect.....	81
J. Gaynor, Y. L. Lim, K. Bertling and A. D. Rakić	
Self-mixing laser velocimetry: A realistic model.....	83
R. Kliese, Y. L. Lim, K. Bertling and A. D. Rakić	
Profiling the change in refractive index using the self-mixing effect in lasers.....	85
F. Ross-Conley, K. Bertling, Y. L. Lim, A. P. Bradley, and A. D. Rakić	
Optical Electrocardiograph using Self-Mixing Interferometer technique with a Customized Electro-Optic Phase Modulator.....	87
A. A. A. Bakar, Y. L. Lim, S. J. Wilson, K. Bertling, M. Fuentes and A. D. Rakić	
Raman study on the phase transformations of the meta-stable phases of Si induced by indentation.....	89
B. Johnson, N. Stavrias, B. Haberl, L. B. B. Aji, J. E. Bradby, J. C. McCallum, and J. S. Williams	
Investigation for effective XRD profile factors for high piezoelectric property.....	91
K. Tsuchiya, Y. Nakada and Y. Uetsuji	
Low temperature transport on surface conducting diamond.....	93
M. T. Edmonds, L. H. Willems van Beveren, K. Ganesan, N. Eikenberg, J. Cervenka, S. Praver, L. Ley, A. R. Hamilton, C. I. Pakes	
Biased target deposition as an effective method for deposition of rare-earth substituted Fe garnets.....	95
N. R. Krishnan, M. Martyniuk, R.D. Jeffery, R.C. Woodward, J.M. Dell and L. Faraone	
Thursday, 13 December 2012	
Metamorphic buffer layers for mid-infrared emitting semiconductor lasers.....	99
L. J. Mawst, D. Botez and T. F. Kuech	
Designing single GaAs nanowire lasers.....	101
D. Saxena, S. Mokkaṭpati, H. H. Tan and C. Jagadish	
Dark Field Optical Tweezers for studying nanoparticle dynamics.....	103
W. J. Toe, K. Pearce, F. Wang and P. J. Reece	
Self-mixing signals in terahertz lasers.....	105
Y. L. Lim, K. Bertling, P. Dean, A. Valavanis, R. Alhathloul, S. P. Khanna, D. Indjin, S. J. Wilson, A. D. Rakić, E. H. Linfield and A. G. Davies	

All dielectric zero-index metamaterials at optical frequencies.....	107
J. Valentine, P. Moitra, Y. Yang and W. Wang	
Mesh substrate for gravitational magnetoelastic metamaterials.....	109
I. E. Khodasevych, G. Kostovski, W. S. T. Rowe and A. Mitchell	
Plasmonic nano-structures for opto-mechanical and sensing applications.....	111
L. Rosa, G. Gervinskas, E. Brasselet and S. Juodkazis	
Vanadium dioxide based tunable plasmonic antennas.....	113
T. James, S. Earl, J. Valentine, T. J. Davis, J. C. McCallum, R. F. Haglund Jr and A. Roberts	
An optically resonant, grating-based technique for the sensitive detection of MEMS cantilever beam height.....	115
G. Putrino, M. Martyniuk, A. Keating, L. Faraone and J. M. Dell	
Spintronics for instant-on non-volatile electronics.....	117
K. L. Wang and P. K. Amiri	
Spintronics materials and devices – ferromagnetic semiconductors and heterostructures.....	119
M. Tanaka, S. Ohya, P. N. Hai and R. Nakane	
Resistive switching in high-k dielectrics for non-volatile memory applications.....	121
R. Elliman, M. N. Saleh, D. K. Venkatachalam, T. H. Kim, K. Belay and F. Karouta	
Low-band gap nanoparticles embedded in high-k dielectrics.....	123
T. Nestler, S. Haas, R. Otto, F. Schneider, S. G. Hickey, S. Gabriel, C. Himcinschi, V. Klemm, G. Schreiber and J. Heitmann,	
InGaAs/GaAsP quantum-well superlattice solar cell for better carrier collection and higher efficiency.....	125
M. Sugiyama, H. Fujii, Y. Wen, Y. Wang, H. Sodabanlu, K. Watanabe, Y. Nakano	
Improved performance of InGaAs/GaAs quantum dot solar cells using Si-modulation doping.....	127
H. F. Lu, L. Fu, G. Jolley, H. H. Tan and C. Jagadish	
Dielectric diffraction gratings for light-trapping in InGaAs-GaAs quantum well solar cells.....	129
S. Turner, S. Mokkalpati, G. Jolley, L. Fu, H. H. Tan and C. Jagadish	
Improved GaAs nanowire solar cells using AlGaAs for surface passivation.....	131
Y. H. J. Lee, Z. Li, L. Fu, P. Parkinson, K. Vora, H. H. Tan and C. Jagadish	
Non-linear direct-laser-write lithography for semiconductor nanowire characterization.....	135
P. Parkinson, K. Peng, N. Jiang, Q. Gao, H. H. Tan and C. Jagadish	
Monolithically integrated multi-section semiconductor laser by selective area quantum well intermixing.....	137
P. Sajewicz, L. Fu, H. H. Tan, K. Vora and C. Jagadish	
Optoelectronic properties of GaAs nanowire photodetector.....	139
H. Wang, P. Parkinson, J. Tian, D. Saxena, S. Mokkalpati, Q. Gao, P. Prasai, L. Fu, F. Karouta, H. H. Tan, and C. Jagadish	
Growth and characterization of GaAsSb nanowires.....	141
X. Yuan, H. H. Tan, P. Parkinson, J. Wong-Leung, S. Breuer, Q. Gao, and C. Jagadish	
Optical properties of silver nanowires grown electrochemically in nanoporous alumina.....	143
M. Aramesh, J. Cervenka, R. Rajasekharan, D. Garrett, J. Fang, K. Ostrikov, S. Prawer	
Sonochemistry and Hydrothermal Pathways to the Fabrication of ZnO Nanowire Transistors.....	145
R. Gore, K. K. Lee, M. Ashokkumar and J.C. McCallum	
Unequal P distribution in nanowires and the layer during the growth of gaasp nanowires on GaAs.....	147
W. Sun, Y. N. Guo, H. Y. Xu, Z. M. Liao, J. Zou, Q. Gao, H. H. Tan, and C. Jagadish	

A numerical model for determining the relative accuracy of the Lande g-factor obtained from ac and dc conductance measurements of quantum point contacts.....	149
S. Fricke, A.M. Burke, and A.P. Micolich	
Demonstration of a stable and flexible coherent multi-dimensional spectroscopy apparatus to study coherent coupling in asymmetric double quantum wells.....	151
J. O. Tollerud, G. Richards, H.H. Tan, C. Jagadish and J. A. Davis	
Film thickness and substrate temperature effect on rf magnetron sputtered Al:ZnO window layer for Cu ₂ ZnSnS ₄ thin film solar cells.....	153
N. Song, X. Hao, J. Huang, Z. Liu, X. Liu, S. Huang, M. Green	
Single crystal and amorphous Ge for use in stand-alone and thin film tandem solar cells.....	155
J. Sharp, W. J. Lee, G. A. Umana-Membreno, J.Dell and L. Faraone	
Meters to nanometers: RF Antennas for optics.....	157
T. James, T.J. Davis and A. Roberts	
Design and analysis of a metasurface for supporting spoof surface plasmon polaritons.....	159
C. M. Shah, W. Withayachumnankul, S. Hanham, S. Maier, W. S. T. Rowe, M. Bhaskaran, S. Sriram and A. Mitchell	
Dielectrophoretic separation of Lactobacillus acidophilus bacteria from Saccharomyces cerevisiae yeasts.....	161
K. Khoshmanesh, S. Baratchi, F.J. Tovar-Lopez, M. Nasabi, A. F. Chrimes, S. Nahavandi, D. Wlodkovic, A. Mitchell, K. Kalantar-zadeh	
Optimisation studies for AlGaIn/GaN-based nitrate sensors.....	163
F. L. M. Khir, M. Myers, A. Podolska, M. V. Baker, B. D. Nener and G. Parish	
Effect of FIB milling on MEMS SOI cantilevers.....	165
C. Venkatesh, P. P. Singh, M. Renilkumar, M. Varma, N. Bhat, R. Pratap, M. Martyniuk, A. Keating, G.A. Umama-Membreno, K.K.M.B.D. Silva, J.M. Dell, L. Faraone	
Strain relaxation behaviour in Ge on insulator fabricated by ion implantation.....	167
T. H. Kim, K. Belay, D. Llewellyn, R. Elliman, D. Choi, and B. Luther-Davies	
Defect levels in low-doped 4h-sic Schottky barrier diodes detected by using alpha particles.....	169
N. Iwamoto, B. C. Johnson, N. Hoshino, M. Ito, H. Tsuchida, T. Ohshima	
Fabrication and Investigation of Nitrogen doped Ultra-Nano-Crystalline Diamond Hall-bar Devices.....	171
N. Eikenberg, K. Ganesan, K. K. Lee, M. Edmonds, L. H. Willems van Beveren and S. Prawer	
Few-layered graphene growth by carbon implantation into polycrystalline nickel substrate.....	173
K. K. Lee, T. Shiell, J.C. McCallum, R. Szymanski, A. Soncini, C. Boskovic and D.N. Jamieson	
Fluorination of single-walled carbon nanotubes via CHF ₃ plasma.....	175
K. K. Lee and Y. Li	
Characterisation of Solid-phase-epitaxy of Amorphous Germanium Thin-films.....	177
M. Leong, J. C. McCallum, K. K. Lee G. Impellizzeri and L. Romano	
Surface-enhanced Raman scattering sensor based on laser nano-textured surfaces	179
R. Buividas, N. F. Fahim, P.R. Stoddart, S. Juodkazis	
Fabrication of 2D close packed arrays of colloidal Si nanoparticles via Langmuir Blodgett deposition.....	181
P. Zhang, S. Huang, G. Conibeer	
Plasma annealing as an effective method for the crystallization of Bi Fe garnet films.....	183
R. Sharda, R.D. Jeffery, M. Martyniuk, R.C. Woodward, J.M. Dell and L. Faraone	
Compositional and mechanical properties of PECVD silicon for thin-film optical applications.....	185
D. K. Tripathi, H. Mao, K.K.M.B.D. Silva and L. Faraone	

Magnetoresistance Characterisation of 4H-SiC MOSFETs.....	187
G. A. Umana-Membreno, J.R. Sharp, A. Choudhary, J. Antoszewski, S. Dhar, S.-H. Ryu, A. K. Agarwal and L. Faraone	
Reduction of gain-saturation in merged beam lasers.....	189
M. Lysevych, H. H. Tan, F. Karouta, L. Fu and C. Jagadish	
Integrated optofluidic flow sensor using the self-mixing effect.....	191
E. Fok, M. Nikolić, Y. L. Lim, K. Bertling and A. D. Rakić	
Is thermal annealing a viable alternative for crystallization in triethylsilylethynyl anthradithiophene (TESADT) organic transistors?.....	193
R. Lyttleton, K. Muhieddine, J.E. Anthony and A.P. Micolich	
Friday, 14 December 2012	
Photo-ionisation spectra of single erbium centres by charge sensing with a nano transistor.....	197
C.M. Yin, M. Rancic, N. Stavrias, G.G. de Boo, J. C. McCallum, M. J. Sellars and S. Rogge	
Observation of the Kondo effect in a spin-3/2 hole quantum dot.....	199
O. Klochan, A. P. Micolich, A. R. Hamilton, K. Trunov, D. Reuter and A. D. Wieck	
Magneto-transport study on the two dimensional electron gas in ZnMgO/ZnO heterostructure.....	201
J. D. Ye, S. T. Lim, S. L. Gu, H. H. Tan, C. Jagadish, K. L. Teo	
Mobility spectrum analysis of p-to-n type converted vacancy doped HgCdTe.....	203
H. Kala, G. A. Umana-Membreno, J. Antoszewski, Z. H. Ye, W. D. Hu, R. J. Ding, X. S. Chen, L. He, J. M. Dell and L. Faraone	
You need another gate, mate’’: g-factor engineering in quantum wires and wrap-gated nanowires.....	205
A.M. Burke, K. Storm, D. J. Carrad, G. Nylund, S. F. Svensson, O. Klochan, A. R. Hamilton, I. Farrer, D. A. Ritchie, H. Linke, L. Samuelson and A. P. Micolich	
Corner and Short-Channel Effects in Recessed Channel Dopant Segregated Schottky Barrier MOS- FETs.....	207
R. K. Hsia and C. H. Shih,	
Electrical characterisation of spin-coated a-IZO thin-film transistors.....	209
L. Deam, K. K. Lee, J. C. McCallum and B. Singh	
Enhanced UV-Blue Response of back illuminated deep double junction CMOS compatible photodiode pixels; a simulation study of high resolution pixel arrays.....	211
P. V. Jansz and S. Hinckley	
Enhanced electrochemical heavy metal ion sensor using liquid metal marbles – towards on-chip applica- tion.....	213
V. Sivan, S. Y. Tang, A. P. O’Mullane, P. Petersen, N. Eshtiaghi, K. Kalantar-zadeh and A. Mitchell	
High-power, high-linearity photodiodes for RF photonics.....	215
J. C. Campbell, A. Beling, M. Piels, Y. Fu, A. Cross, Q. Zhou, J. Peters, J. E. Bowers and Z. Li	
Fabrication of single photon centres in Silicon Carbide.....	217
B. C. Johnson, S. Castelletto, T. Ohshima and T. Umeda	
Structural and optical properties of H implanted ZnO.....	219
K. S. Chan, J. D. Ye, P. Parkinson, E. Monakhov, K. M. Johansen, L. Vines, B. G. Svensson, C. Jagadish and J. Wong-Leung	
The nitrogen-vacancy spin qubit for sensing in biology.....	221
L. C. L. Hollenberg	
ZnO nanostructures for sensing of H ₂ S.....	223
K. J. Iversen and M. Spencer	