

ASDAM 2008

Conference Proceedings

The Seventh International Conference on Advanced Semiconductor Devices and Microsystems

Smolenice Castle, Slovakia
October 12-16, 2008

Contents

Electrical properties of carbon nanotube FETs T. Mizutani, Y. Ohno, and S. Kishimoto	1
Graphene-like Silicon Nano-ribbons on the Silver (110) Surface M. E. Dávila, C. Léandri, A. Kara , B. Ealet, P. de Padova, B. Aufray, and G. Le Lay	9
Surface control structures for high-performance AlGaIn/GaN HEMTs T. Hashizume	17
Reliability aspects of GaN-HEMTs on composite substrates F. Zanon, F. Danesin, A. Tazzoli, M. Meneghini, N. Ronchi, A. Chini, P. Bove, R. Langer, E. Zaroni, and G. Meneghesso	23
Silicon-based field-effect devices for (bio-)chemical sensing M. J. Schöning and A. Poghosian	31
III-V MOSFETs for digital applications with silicon co-integration K. Kalna, A. Asenov, J. S. Ayubi-Moak , A. J. Craven, R. Droopad, R. Hill, M. C. Holland, X. Li, A. R. Long, P. Longo, D. MacIntyre, M. Passlack, G. Paterson, C. R. Stanley, S. Thoms, H. Zhou, and I. G. Thayne	39
Study of the hysteresis in magnetic layer structures V. Āč	47
Physical modelling of a step-graded AlGaAs/GaAs Gunn diode and investigation of hot electron injector performance F. Amir, N. Farrington, T. Tauqeer, and M. Missous	51
Physical modelling of the Kink effect in strained InGaAs/InAlAs pHEMTs S. Arshad, M. Mohiuddin, A. Bouloukou, and M. Missous	55
Constant voltage stress induced current in Ta₂O₅ stacks E. Atanassova, A. Paskaleva, and D. Spassov	59
Si₃N₄ based non-volatile memory structures with embedded Si nanocrystals P. Basa, Zs. J. Horváth, T. Jászai, A. E. Pap, G. Molnár, A. Kovalev, D. Wainstein, and P. Turmezei	63
Bottom collection of photodiode-based CMOS APS B. Blanco-Filgueira, P. López, D. Cabello, J. Ernst, H. Neubauer, and J. Hauer	67
Characterization of semiconductor devices at very high temperatures P. Borthen and G. Wachutka	71
Sub-0.5 dB NF broadband low-noise amplifier using a novel InGaAs/InAlAs/InP pHEMT B. Boudjelida, A. Sobih, S. Arshad, A. Bouloukou, S. Boulay, J. Sly, and M. Missous	75
Design of low leakage InGaAs/InAlAs pHEMTs for wide band (300MHz to 2GHz) LNAs A. Bouloukou, B. Boudjelida, A. Sobih, S. Boulay, J. Sly, and M. Missous	79
NMOS and PMOS translinear multiplying cell for current-mode signal processing A. Boura and M. Husak	83
InAlN/GaN MOSHEMT with Al₂O₃ insulating film K. Čičo, D. Gregušová, J. Kuzmík, M. A. di Forte-Poisson, T. Lalinský, D. Pogany, S. L. Delage, and K. Fröhlich	87
Low-temperature hole mobility in rolled-up Si/SiGe heterostructures N. V. Demarina and D. A. Gruetzmacher	91

1D-array of metallic nanowires as sensing element for optical sensor: modeling and characterization	95
N. L. Dmitruk, O. I. Mayeva, A. V. Korovin, S.V. Mamykin, M. V. Sosnova, and V.I. Min'ko	
Contribution of surface plasmon-polaritons and surface plasmons into photocurrent of Schottky diodes with corrugated interface	99
N. Dmitruk, S. Mamykin, A. Korovin, and M. Sosnova	
Electrical properties of ohmic contacts for $\text{Al}_{0.3}\text{Ga}_{0.7}\text{N}$ /GaN semiconductor devices	103
M. Florovič, J. Kováč, P. Kordoš, J. Škriniarová, T. Lalinský, Š. Haščík, M. Michalka, D. Donoval, and F. Uherek	
Role of rare-earth elements in the design of radiation detectors and electroluminescent sources	107
J. Grym, O. Procházková, J. Zavadil, and K. Žďánský	
OMVPE growth and characterization of $\text{Ga}_{1-x}\text{Mn}_x\text{As}$ diluted magnetic semiconductor	111
S. Hasenöhr, M. Kučera, M. Morvic, and J. Novák	
Quantum-corrected simulation of complementary nanowire tunneling transistors of 5 nm gate-length	115
A. Heigl and G. Wachutka	
Electrical behaviour of Au/InGaAsSb and Au/GaSb junctions	119
Zs. J. Horváth, V. Rakovics, and B. Pődör	
Low equivalent oxide thickness metal/insulator/metal structures for DRAM application	123
B. Hudec, M. Ľapajna, K. Hušeková, J. Aarik, A. Aidla, and K. Fröhlich	
Hydrogenated amorphous carbon films prepared by plasma-enhanced chemical vapor deposition	127
J. Huran, A. P. Kobzev, N. I. Balalykin, and J. Pezoldt	
Temperature wireless sensor network	131
M. Husak, J. Jakovenko, and T. Vitek	
Vertical velocity measurement - processing of sensor data using altitude corrections	135
M. Husak, T. Vitek, and A. Boura	
Simulation studies of current voltage characteristics of inhomogeneous Schottky diode with discrete distribution of barrier heights	139
S. Chand	
Analysis of the geometry on robustness of ESD protection devices	143
A. Chvala, D. Donoval, P. Beno, J. Marek, and T. Kosik	
Pentacene OTFT with parylene gate dielectric	147
J. Jakabovič, J. Kováč, R. Srnánek, J. Kováč jr., M. Sokolský, and D. Haško	
Processing and characterization of recessed-gate AlGaIn/GaN HFETs	151
N. Ketteniß, M. Eickelkamp, A. Noculak, R. H. Jansen, and A. Vescan	
Interpretation of the DLTS spectra of silicon p-n junctions prepared by diffusion technique	155
D. Kindl, P. Hubík, J. J. Mareš, and J. Křištofik	
Destruction in the active part of an IGBT chip caused by avalanche-breakdown at the edge termination structure	159
U. Knipper, F. Pfirsch, T. Raker, J. Niedermeyr, and G. Wachutka	
Wet thermal oxidation for GaAs, GaN and Metal/GaN device applications	163
R. Korbutowicz, J. Prażmowska, Z. Wągrowski, A. Szyszka, and M. Tłaczała	
Detection of breathing	167
J. Kroutil and M. Husák	

Design of the state machine for A/D converter M. Kubař and J. Jakovenko	171
Design and fabrication of high-temperature SOI strain-gauges P. Kulha, A. Bouřa, M. Husák, P. Mikulík, M. Kučera, and S. Valenda	175
The investigation of semi-insulating GaAs detectors properties after neutron irradiation M. Ladziarský, A. Šagátová, and V. Nečas	179
Investigation of Ti/Al ohmic contact to N-type 6H-SiC P. Macháč and B. Barda	183
Ruthenium based Schottky contacts on n-type GaN W. Macherzynski, A. Szyszka, B. Paszkiewicz, R. Paszkiewicz, and M. Tłaczała	187
Modelling and characterisation of fractal based rf inductors on silicon substrate A. Marić, G. Radosavljević, M. Živanov, Lj. Živanov, G. Stojanović, M. Mayer, A. Jachimowicz, and F. Keplinger	191
Sub-micrometer Hall probes prepared by tip-induced local anodic oxidation J. Martaus, V. Cambel, D. Gregušová, and R. Kúdela	195
New progressive method suitable for the exposure optimization of large and complex defect-free chips direct written by ZBA 21 e-beam tool L. Matay, R. Andok, V. Barák, A. Konečnicková, I. Kostič, S. Partel, and P. Hudek	199
The disposable Dot Field Effect Transistor: Process flow and overlay requirements J. Moers, J. Gerharz, St. Trelenkamp, A.v.d. Hart, G. Mussler, and D. Grützmacher	203
2-D physical modelling of δ-doped GaAs/AlGaAs HEMT M. Mohiuddin, S. Arshad, A. Bouloukou, and M. Missous	207
PDMS-glass bonded lab-on-a-chip device for single cell analysis V. R. S. S. Mokkapat, Oana. M. Piciu, L. Zhang, J. Mollinger, J. Bastemeijer, and A. Bossche	211
Some remarks to the nanowires grown on III-V substrate Á. Nemcsics, E. Horváth, S. Nagy, L. M. Molnár, I. Mojzes, and Zs. J. Horváth	215
InMnAs dots grown on GaAs surfaces etched via AlAs sacrificial layer J. Novák, P. Eliáš, J. Šoltýs, S. Hasenöhrl, and I. Vávra	219
Analysis and measurement of capacitive coupling in integrated circuits J. Novak, J. Foit, and V. Janicek	223
3-D silicon carbide surface micromachined accelerometer compatible with CMOS processing L. S. Pakula, H. Yang, and P. J. French	227
Edge-emitting laser diode with GaAs triple QW in active region investigated by NOBIC D. Pudis, L. Suslik, I. Martincek, J. Kovac, J. Kovac, jr., and V. Gottschalch	231
GHz class low -power flash adc for broadband communications J. Sexton, T. Tauqeer, M. Mohiuddin, and M. Missous	235
A new generation of cryogenic silicon diode temperature sensors Yu. M. Shwarts, M. M. Shwarts, and S. V. Sapon	239
Influence of Eu, Tb, Pd dopants on electrical and optical properties of nanostructured TiO₂ thin films K. Sieradzka, J. Domaradzki, and D. Kaczmarek	243
Reliability issues of AlGaIn/GaN heterostructures field-effect transistors J. Škriniarová, M. Florovič, J. Kováč, D. Donoval, and P. Kordoš	247

Hole transport in the p-type RTD Z. Šobáň, J. Voves, M. Cukr, and V. Novák	251
Characterisation of organic field effect transistor structures by micro-Raman spectroscopy, AFM and XRD methods R. Srnánek, J. Kováč, J. Jakabovič, J. Kováč jr., G. Irmer, E. Dobročka, and D. Haško	255
Purification action of rare-earth elements in the LPE growth of III-V semiconductors: Feedback phenomena F. Šrobár and O. Procházková	259
Influence of annealing on electrical properties of AlGaIn/GaN HFETs and MOSHFETs using Al₂O₃ R. Stoklas, D. Gregušová, J. Novák, and P. Kordoš	263
Electrical characterization of Ru- and RuO₂/Ta₂O₅ gate stacks for nanoscale DRAM technology M. Ťapajna, E. Dobročka, A. Paskaleva, K. Hušeková, E. Atanassova, and K. Fröhlich	267
Two-dimensional physical and numerical modelling of InP-based heterojunction bipolar transistors T. Tauqeer, J. Sexton, F. Amir, and M. Missous	271
Preparation of transparent conductive AZO thin films for solar cells V. Tvarožek, P. Šutta, I. Novotný, P. Ballo, L. Harmatha, S. Flickyngarová, L. Prušáková, M. Netrvalová, V. Vavruňková, A. Pullmannová, E. Vavrinský, P. Gašpírek, and M. Mikolášek	275
Electro-optical monitoring of human cognitive processes E. Vavrinský, V. Stopjaková, I. Brezina, V. Tvarožek, L. Majer, and P. Soláriková	279
Photoelectrical properties of TOS thin films based on TiO₂ prepared by modified magnetron sputtering D. Wojcieszak, J. Domaradzki, D. Kaczmarek, and B. Adamiak	283
Role of spacer thickness on magnetoresistance characteristics under mechanical strain B. Anwarzai, V. Áč, Š. Luby, E. Majková, and R. Senderák	287
PECVD Silicon Carbon Nitrid Thin Films: Properties P. Boháček, J. Huran, A. P. Kobzev, N. I. Balalykin, and J. Pezoldt	291
Study of bulk semi-insulating GaAs radiation detectors: Role of ohmic contact metallization in electrical charge transport and detection performance F. Dubecký, B. Zaťko, P. Hubík, P. Boháček, E. Gombia, and Š. Chromík	295
Registration of fast neutrons emissions from hot plasmas by bulk semi-insulating GaAs detectors F. Dubecký, L. Ryč, J. Kaczmarczyk, M. Scholz, B. Zaťko, P. Boháček, J. Huran, and M. Ladziński	299
Localised etching of (100) GaAs via an AlAs sacrificial layer P. Eliáš, I. Kostič, R. Kúdela, and J. Novák	303
Characterization of homoepitaxial germanium p-n junctions for photovoltaic and thermophotovoltaic applications C. Ferrari, M. Bosi, G. Attolini, C. Frigeri, E. Gombia, C. Pelosi, S. Arumainathan, and N. Musayeva	307
Surface acoustic wave excitation on SF₆ plasma treated AlGaIn/GaN heterostructure T. Lalinský, L. Rufer, G. Vanko, I. Rýger, Š. Haščík, M. Tomáška, Ž. Mozolová, and A. Vincze	311
Analysis of novel MagFET structures for built-in current sensors supported by 3 D modeling and simulation J. Marek, D. Donoval, M. Donoval, and M. Daříček	315

Simulation of influence of AlGaIn/GaN heterojunction parameters on its capacitance curves J. Osvald	319
Preparation and properties of micro-hotplates for gas sensors based on GaAs D. Tengeri, A. Pullmannová, I. Hotový, V. Řeháček, Š. Haščík, and T. Lalinský	323
DRIE and bonding assisted low cost MEMS processing of In-plane HAR inertial sensors V. Rajaraman, K. A. A. Makinwa, and P. J. French	327
High frequency characterization and properties of AlGaIn/GaN HEMT structures M. Tomáška, T. Lalinský, G.Vanko , and M. Mišun	331
Impact of SF6 plasma on DC and microwave performance of AlGaIn/GaN HEMT structures G. Vanko, T. Lalinský, M. Tomáška, Š. Haščík, Ž. Mozolová, J. Škriniarová, I. Kostič, A. Vincze, and F. Uherek	335
Preliminary tests of semi-insulating GaAs radiation detectors coupled to the multichannel ASIC DX64 readout chip B. Zařko, F. Dubecký, P. Ščepko, P. Gryboš, and J. Mudroň	339

Author index