

# **2010 8th International Conference on Advanced Semiconductor Devices & Microsystems**

**(ASDAM 2010)**

**Smolenice, Slovakia  
25 – 27 October 2010**



**IEEE Catalog Number: CFP10469-PRT  
ISBN: 978-1-4244-8574-1**

## CONTENTS

<b>Organizers</b>	<i>iii</i>
<b>International Programme Committee</b>	<i>iv</i>
<b>Foreword</b>	<b>v</b>
<b>Contents</b>	<i>vi</i>
<b>Invited Talk 1</b>	
<b>Nanoscaled SiGe based MOSETs</b>	<b>1</b>
M. Östling	
<b>Structures &amp; Devices 1</b>	
<b>Single photon detection by means of SiGe-quantum dot arrays</b>	<b>9</b>
J. Moers, N. P. Stepina, J. Gerharz, E.S. Koptev, A.I. Nikiforov, A.V. Dvurechenskii, D. Grützmacher	
<b>Model for Evaluation of Terahertz Plasma Resonances in HEMT-Based Devices with Grating Gate</b>	<b>13</b>
I. Khmyrova, R. Yamase, N. Watanabe	
<b>Ultra High Frequency Performance in All Ternary In<sub>0.52</sub>Al<sub>0.48</sub>As-In<sub>0.53</sub>Ga<sub>0.47</sub>As-In<sub>0.52</sub>Al<sub>0.48</sub>As DHBT</b>	<b>17</b>
R. Knight, J. Sexton, M. Missous	
<b>Structures &amp; Devices 2</b>	
<b>Light emitting diode with 2D PhC structure in the surface analysed by NSOM</b>	<b>21</b>
L. Suslik, D. Pudis, J. Skriniarova, J. Kovac, J. Kovac, jr., I. Kubicova, I. Martincek, J. Jakabovic, J. Novak	
<b>100mV noise performances of Te-doped Sb-HEMT</b>	<b>25</b>
A. Noudeviwa, A. Olivier, Y. Roelens, F. Danneville, N. Wichmann, N. Waldhoff, L. Desplanque, X. Wallart, S. Bollaert	
<b>Development of Advanced Gunn Diodes and Schottky Multipliers for High Power THz sources</b>	<b>29</b>
F. Amir, C. Mitchell, M. Missous	
<b>3-D Simulation of a 45 nm Partially Depleted Silicon on Insulator (SOI) Transistor with Diamond-Shaped Body Contact</b>	<b>33</b>
A. Daghighi, A. Farajzadeh	
<b>Electrical and optical properties of ZnO/Si photodiodes with embedded CdTe and CdSe/ZnS nanoparticles</b>	<b>37</b>
J. Hotovy, J. Kovac, J. Skriniarova, I. Novotny, J. Jakabovic, J. Kovac jr.	

<b>Poster Session 1 Technology &amp; Devices</b>	
<b>Fabrication of Novel High Frequency and High Breakdown InAlAs-InGaAs pHEMTs</b>	<b>41</b>
M. Mohamad Isa, D. Saguatti, G. Verzellesi, A. Chini, K. W. Ian, M. Missous	
<b>A Width-Dependent Body-Voltage Model to Obtain Body Resistance in PD SOI MOSFET Technology</b>	<b>45</b>
A. Daghighi, A. Asgari-Khoshoie	
<b>Reactive ion etching of Al<sub>x</sub>Ga<sub>1-x</sub>N/GaN heterostructure using Cl<sub>2</sub> BCl<sub>3</sub>/Ar gas plasma</b>	<b>49</b>
W. Oleszkiewicz, J. Gryglewicz, B. Paszkiewicz, R. Paszkiewicz, A. Szyszka, M. Ramiączek - Krasowska, A. Stafiniak, M. Tłaczala	
<b>Noise in the InAlN/GaN HEMT transistors</b>	<b>53</b>
K. Rendek, A. Satka, J. Kovac, D. Donoval	
<b>Inter-digitated AlGaIn/GaN Schottky diode for monolithic integration</b>	<b>57</b>
B. Paszkiewicz, R. Paszkiewicz, M. Wosko, M. Tłaczala	
<b>Preparation and properties of ZnO nanomaterials for sensoric applications</b>	<b>61</b>
T. Brath, D. Buc, M. Caplovicova, L. Caplovic, M. Predanocy, V. Hrnčiar	
<b>Influence of thickness on transparency and sheet resistance of ITO thin films</b>	<b>65</b>
M. Mazur, D. Kaczmarek, J. Domaradzki, D. Wojcieszak, S. Song, F. Placido	
<b>Thermoelectrical properties of TiO<sub>2</sub>:(Co, Pd) and TiO<sub>2</sub>:Nb thin films</b>	<b>69</b>
E. Prociow, M. Mazur, J. Domaradzki, D. Wojcieszak, D. Kaczmarek, T. Gawor	
<b>Effect of Substrate Temperature on Oblique-Angle Sputtered ZnO:Ga Thin Films</b>	<b>73</b>
I. Novotny, D. Kotorova, S. Flickyngerova, V. Tvarozek, L. Spiess, P. Schaaf, M. Netřvalova, P. Sutta	
<b>Nanocrystalline Diamond/amorphous Composite Carbon Films Prepared by PECVD Technology for Photocathode Application</b>	<b>77</b>
J. Huran, N. I. Balalykin, G. D. Shirkov, P. Bohacek, A. P. Kobzev, A. Valovic	
<b>N-doped Nanocrystalline Silicon Carbide Films Prepared by PECVD Technology</b>	<b>81</b>
P. Bohacek, J. Huran, A. Valovic, A. P. Kobzev, V. N. Shvetsov, M. Kucera, L. Malinovsky	
<b>Material optimization of the alignment marks for the EBDW lithography</b>	<b>85</b>
L. Matay, R. Andok, V. Barak, A. Ritomsky, A. Konecnikova, I. Kostic, S. Partel, P. Hudek	
<b>Patterning of nanometer structures by using direct-write e-beam lithography for the sensor development</b>	<b>89</b>
P. Durina, M. Stefecka, T. Roch, J. Noskovic, M. Trgala, A. Pidik, I. Kostic, A. Konecnikova, L. Matay, P. Kus, Plecenik	
<b>Temperature dependence of the pyroelectric behaviour in GaN/AlGaIn</b>	<b>93</b>
A. Laposá, J. Jakovenko, M. Husak	
<b>Off-state stress investigation of InAlN/GaN HFETs with different AlN buffer layer</b>	<b>97</b>
M. Florovic, J. Kovac, H. Behmenburg, P. Kordos, J. Skriniarova, D. Donoval	
<b>Growth and structural properties of GaAs on Al pseudo-substrates for ultrafast optoelectronics</b>	<b>101</b>
Z. Sofer, D. Sedmidubsky, M. Mikulics	
<b>Invited Talk 2</b>	
<b>GaN Power Electronics</b>	<b>105</b>
B. Lu, D. Piedra, T. Palacios	
<b>GaN Based Structures &amp; Devices 1</b>	
<b>AlGaIn/GaN HEMT on Si (111) substrate for millimeter microwave power applications</b>	<b>111</b>
S. Bouzid, V. Hoel, N. Defrance, H. Maher, F. Lecourt, M. Renvoise, D. Smith, J. C. De Jaeger	

<b>Characterisation of electrical properties of AlGaIn/GaN Schottky diode at very high temperature</b>	<b>115</b>
A. Chvala, D. Donoval, R. Sramaty, J. Marek, J. Kovac, P. Kordos, J. Skriniarova	
<b>On the Identification of Trap Location in AlGaIn/GaN HEMTs during Electrical Stress</b>	<b>119</b>
M. Tapajna, R. J. T. Simms, Y. Pei, U. K. Mishra, M. Kuball	
<b>GaN Based Structures &amp; Devices 2</b>	
<b>Study of temperature distribution in the channels of AlGaIn/GaN HEMT devices by <math>\mu</math>-Raman characterization techniques</b>	<b>123</b>
J. Kovac jr., S. K. Jha, E. V. Jelenković, O. Kutsay, M. Pejović, C. Surya, J. A. Zapien, I. Bello, R. Srnanek, J. Kovac, S. Flickyngerova	
<b>Modelling and optimisation of a sapphire/GaN-based diaphragm structure for pressure sensing in harsh environments</b>	<b>127</b>
M. J. Edwards, S. Vittoz, R. Amen, L. Rufer, P. Johander, C. R. Bowen, D. W. E. Allsopp	
<b>HEMT-SAW Structures for Chemical Gas Sensors in Harsh Environment</b>	<b>131</b>
I. Ryger, T. Lalinsky, G. Vanko, M. Tomaska, I. Kostic, S. Hascik, M. Vallo	
<b>Investigation of Deep Energy Levels in Heterostructures based on GaN by DLTS</b>	<b>135</b>
L. Stuchlikova, J. Sebok, J. Rybar, M. Petrus, M. Nemeč, L. Harmatha, J. Benkovska, J. Kovac, J. Skriniarova, T. Lalinsky, R. Paskiewicz, M. Tlaczala	
<b>Molecular dynamics and Electrical Simulation of a Novel GaN/4H-SiC Hetero-structure Optically Triggered Vertical NPN Device</b>	<b>139</b>
S. Bose, S. K. Mazumder	
<b>Analysis of structure geometry and interface charge on electrical characteristics of InAlN/GaN HEMTs</b>	<b>143</b>
J. Marek, D. Donoval, J. Kovac, M. Molnar, A. Chvala, P. Kordos	
<b>Invited Talk 3</b>	
<b>GaN for THz Sources</b>	<b>147</b>
M. Marso	
<b>GaN Based Structures &amp; Devices 3</b>	
<b>Preparation and properties of AlGaIn/GaN MOS-HFETs with atomic layer deposited Al<sub>2</sub>O<sub>3</sub> as gate oxide</b>	<b>155</b>
R. Stoklas, D. Gregusova, M. Blaho, P. Kordos, M. Tajima, T. Hashizume	
<b>Comparison of AlGaIn/GaN HFETs and MOSHFETs in prospect of oscillator design</b>	<b>159</b>
A. Fox, M. Mikulics, B. Strang, M. Marso, D. Grützmacher, P. Kordos	
<b>Role of the gate-to-drain distance in the performance of the normally-off InAlN/GaN HEMTs</b>	<b>163</b>
J. Kuzmik, Ostermaier, G. Pozzovivo, B. Basnar, W. Schrenk, J.-F. Carlin, M. Gonschorek, E. Feltin, N. Grandjean, Y. Douvry, Ch. Gaquière, J.-C. De Jaeger, G. Strasser, D. Pogany, E. Gornik	
<b>Influence of interface states on C-V characteristics of AlGaIn/GaN heterostructures</b>	<b>167</b>
J. Osvald	
<b>Materials &amp; Technology 1</b>	
<b>Effects of soft-UV irradiation on organic thin film transistors with different gate dielectrics</b>	<b>171</b>
N. Wrachien, A. Cester, G. Meneghesso, J. Kovac, J. Jakabovic, D. Donoval	
<b>Design, preparation and properties of spin-LED structures based on InMnAs</b>	<b>175</b>
P. Telek, S. Hasenöhrl, J. Soltys, I. Vavra, M. Drzik, J. Novak	

<b>Study of ZnO Films Grown with Different Dopants - Physical Properties and Their Comparison</b>	<b>179</b>
L. Prusakova, M. Netrvalova, P. Sutta	
<b>Synthesis and Doping of Zinc-Oxide Thin Films by RF Sputtering and Ion Implantation</b>	<b>183</b>
M. Milosavljević, D. Perusko, V. Milinović, P. Gaspierik, I. Novotny, V. Tvarozek	
<b>MO CVD growth of ZnO with different growth rate</b>	<b>187</b>
D. Nohavica, P. Gladkov, J. Grym, Z. Jarchovsky	
<b>Poster Session 2 Characterization &amp; Sensors</b>	
<b>Optimization of Position of Piezoresistive Elements on Substrate Using FEM Simulations</b>	<b>191</b>
P. Kulha	
<b>A new model of trap assisted band-to-band tunnelling</b>	<b>195</b>
M. Mikolasek, J. Racko, L. Harmatha, O. Gallo, J. Reznak, F. Schwierz, R. Granzner	
<b>Simulation Study of Conduction-state Charge Imbalance in High Voltage Super-junction Power MOSFET</b>	<b>199</b>
K. Pravin N	
<b>Electrode configuration for EMG measurements</b>	<b>203</b>
E. Vavrinsky, K. Rendek, M. Daricek, M. Donoval, F. Horinek, M. Horniak, D. Donoval	
<b>Semi-insulating GaAs radiation detectors: PICTS study of neutron-induced defects</b>	<b>207</b>
F. Dubecky, M. Ladziansky, D. Kindl, V. Necas	
<b>Wireless Sensor System for Overhead Line Ampacity Monitoring</b>	<b>211</b>
J. Frolec, M. Husak	
<b>Wireless Sensor Network Control System</b>	<b>215</b>
M. Husak, A. Boura, J. Jakovenko	
<b>Detection of soft X-rays using semi-insulating GaAs detector</b>	<b>219</b>
B. Zatko, F. Dubecky, P. Bohacek, V. Necas, L. Ryc	
<b>Use of Barometric Sensor for Vertical Velocity Measurement</b>	<b>223</b>
M. Husak, J. Jakovenko	
<b>Monitoring of Car Driver Physiological Parameters</b>	<b>227</b>
E. Vavrinsky, V. Tvarozek, V. Stopjakova, P. Solarikova, I. Brezina	
<b>Broadband amplitude-stabilized oscillator</b>	<b>231</b>
J. Foit, J. Novak	
<b>Potentiality of the Inductive Powering for Measurement in the Enclosed Systems</b>	<b>235</b>
A. Boura, M. Husak	
<b>Influence of Conductor Systems on the Crosstalks in Integrated Circuits</b>	<b>239</b>
J. Novak, J. Foit, V. Janicek	
<b>Simulation of a planar Micro Ion Mobility Spectrometer for Security Applications</b>	<b>243</b>
R. Cumeras, I. Gràcia, E. Figueras, L. Fonseca, J. Santander, M. Salleras, C. Calaza, N. Sabaté, C. Cané	
<b>Characterization of high permittivity GdScO<sub>3</sub> films prepared by liquid injection MOCVD</b>	<b>247</b>
M. Jurkovic, K. Husekova, K. Cico, E. Dobrocka, M. Nemeč, J. Fedor, K. Fröhlich	
<b>Biomedical signal amplifier for EMG wireless sensor system</b>	<b>251</b>
K. Rendek, M. Daricek, E. Vavrinsky, M. Donoval, D. Donoval	

<b>Resistive switching in RuO<sub>2</sub>/TiO<sub>2</sub>/RuO<sub>2</sub> MIM structures for non-volatile memory application</b>	<b>255</b>
B. Hudec, M. Hranai, K. Husekova, J. Aarik, A. Tarre, K. Fröhlich	
<b>Invited Talk 4</b>	
<b>Micro-power converters for energy harvesting devices</b>	<b>259</b>
E. Sangiorgi, A. Romani, M. Tartagni	
<b>Sensors &amp; Microsystems 1</b>	
<b>A monolithic micro fuel cell based on a functionalized porous silicon membrane</b>	<b>263</b>
N. Torres-Herrero, J. Santander, N. Sabaté, C. Cané, T. Trifonov, A. Rodriguez, R. Alcubilla	
<b>Experimental Analysis and Modeling of the Mechanical Impact during the Dynamic Pull-In of RF-MEMS Switches</b>	<b>267</b>
M. Niessner, J. Iannacci, G. Schrag, G. Wachutka	
<b>Sensors &amp; Microsystems 2</b>	
<b>Hybrid photonic/plasmonic ZnO/Au composites for sensing applications</b>	<b>271</b>
J. A. Zapien, L. Yu, C. H. To, C. Limiao, J. Kovac jr., I. Bello, S. T. Lee	
<b>Constitutive Equation of the Dipole Layer in Hydrogen-sensing Metal-Oxide-Semiconductor Structures</b>	<b>275</b>
F. Srobar, O. Prochazkova	
<b>Radiation Effects on CMOS Image Sensors due to X-Rays</b>	<b>279</b>
J. Tan, B. Büttgen, A. J. P. Theuwissen	
<b>First Measurement on the DEPFET Mini-Matrix Particle Detector System</b>	<b>283</b>
J. Scheirich, C. Oswald, P. Kodys	
<b>Invited Talk 5</b>	
<b>SEM techniques for characterization of GaN nanostructures and devices</b>	<b>295</b>
A. Satka, J. Kovac, J. Priesol, A. Vincze, F. Uherek, M. Michalka	
<b>Characterization of Materials &amp; Structures</b>	
<b>Study of optical and electrical properties of sputtered indium oxide films</b>	<b>297</b>
M. Predanocy, I. Fasaki, M. Wilke, I. Hotovy, I. Kosc, L. Spiess	
<b>Characterization and optical properties of TiO<sub>2</sub> prepared by pulsed laser deposition</b>	<b>301</b>
O. Kadar, F. Uherek, J. Chlpik, J. Remsa, J. Bruncko, A. Vincze, M. Jelinek	
<b>New InP Based pHEMT Double Stage Differential to Single-ended MMIC Low Noise Amplifiers for SKA</b>	<b>305</b>
N. Ahmad, S. Arshad, M. Missous	
<b>SIMS depth profile characterisation of InAlN/GaN structures</b>	<b>309</b>
A. Vincze, J. Kovac, H. Behmenburg, R. Srnanek, F. Uherek, D. Donoval, M. Heuken	
<b>Modeling &amp; Simulation</b>	
<b>Physics-Based Modeling of Electromagnetic Parasitic Effects in Interconnects and Busbars</b>	<b>313</b>
G. Wachutka, P. Böhm	

<b>Compact Model Extraction from Quantum Corrected Statistical Monte Carlo Simulation of Random Dopant Induced Drain Current Variability</b>	<b>317</b>
U. Kovac, C. Alexander, G. Roy, B. Cheng, A. Asenov	
<b>Monte Carlo Simulations of Channel Scaling to Ultimate Limit in Si and In<sub>0.3</sub>Ga<sub>0.7</sub>As Bulk MOSFETs</b>	<b>321</b>
A. Islam, K. Kalna	
<b>Analytical Modelling of InGaP/GaAs HBTs</b>	<b>325</b>
G. Dutta, S. Basu	
<b>Materials &amp; Technology 2</b>	
<b>Structure and optical properties of the hydrogen diluted a-Si:H thin films prepared by PECVD with different deposition temperatures</b>	<b>329</b>
M. Netrvalova, M. Fischer, J. Mullerova, M. Zeman, P. Sutta	
<b>Structural and chemical analysis of self-aligned titanium silicide formed by furnace annealing</b>	<b>333</b>
E. Barbarini, S. Guastella, F. Pirri	
<b>The Compound Oxides Based on TiO<sub>2</sub> and NiO Thin Films for Low Temperature Gas Detection</b>	<b>337</b>
I. Kosc, I. Hotovy, M. Kompitstas, R. Grieseler, M. Wilke, V. Rehacek, M. Predanocy, T. Kups, L. Spiess	
<b>RuO<sub>2</sub>/TiO<sub>2</sub> based MIM capacitors for DRAM application</b>	<b>341</b>
B. Hudec, K. Husekova, J. Aarik, A. Tarre, A. Kasikov, K. Fröhlich	
<b>Author index</b>	<b>345</b>