TECHNICAL PROGRAM
The primary role of nanotechnology is to provide disruptive technologies for social sustainability and industrial revitalization. The theme of this presentation is to discuss the future direction of nanotechnology R&D in a global society.

11:15 PL-1-2
More Moore and More Than Moore meeting for 3D in the 21st century
S. Deleonibus, CEA-LETI, France
Co-integrating more than Moore devices with CMOS to interface the outside Multiphysics world brings Functional Diversification. 3D integration will address at wafer level device to packaging technologies capable to reduce cost and improve system performance.

12:00-13:00 Lunch
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method. We investigated the relationship between emitting polymer/cathode interface by using a We simulated the electron injection on the light

organic semiconductor materials is determined by als, e.g., pentacene, polythiophene, etc. has resulted

Probing of Transient Electric Field Distribution

Semiconductors (Area 10)

The transient absorption characteristics are useful

tics at Visible Wavelength Region for NMe2-

Effects of GeO2-Metal Interaction on VFB of

Orientations of single-crystal Ge stripes are con-

We have experimentally studied abrupt source

- 18 -


Chairs: M. Yoshida (AIST)

E. Ishii (Shinshu Univ.)

A-1: Organic Device Physics (Area 10)

B-1: Ge MOS Technology 2 (Area 1)

Chairs: M. Yoshida (AIST)

E. Ishii (Shinshu Univ.)

A-4: 14:45-15:15

Non-Contact Measurement of Charge Carrier Mobility in Inorganic and Organic Semiconductor Materials

S. Seki1, A. Asano, T. Honoji and A. Seki1

1Osaka Univ. and 1PRESTO, JST (Japan)

Intrinsic charge carrier mobility in inorganic and organic semiconductor materials is determined by non-contact microwave measurement technique as the short-range transport properties of charge carriers, and is compared to the values by several conventional techniques.

15:15 A-2

Probing of Transient Electric Field Distribution in ITO/P3HT/PHATP Using Time-Resolved Scanned Harmonic Generation Measurement

R. Misawa, D. Taguchi, T. Manaka and I. Jinno-

Tokai, Yokohama, Japan

The discovery of highly conducting organic mate-
ials, e.g., pentacene, polypyrrole, etc. has resulted in studies of their possible application to organic electronics, such as organic electrochemi-
nal devices (OLEDs), organic solar cells and organic field-effect transistors (OFETs).

13:30 B-1-3

Nature of Interface Traps in Ge MS Structures with GeO2 Interfacial Layers

N. Tsuiki, W. Misumaihara, Y. Morita, S. Migita, H. Oka, A. Yoshikawa1,2, M. Hoshi, Tokai Univ. (Japan)

We systematically studied the mobility modulation by transfer layout configuration in Si and SiGe channel pMOSFETs, and found that hole mobility in <100> channel SiGe is the highest in short and narrow channel pMOSFETs.

14:00 B-1-4

Layout Dependent STI Stress Effect on High Frequency Performance and Flicker Noise in Nanoscale CMOS Devices

K. Y. Lee, C. Y. Ku, C. G. Guo, National Chiao Tung Univ. (Taiwan)

The impact of MOSFET layout dependent stress on high frequency performance and flicker noise is investigated. Donut MOSFETs, attributed to the sup-

presents the newly adopted operation power converters. The state of the art models are

14:00 C-1-4

Highly Drastic reduction of the low frequency noise in Nonlinear Optics (Area 7)

P. Guenther, A. Tpopularo, R. Kuroda, Y. Nakao, H. Ohsuna, A. Yoshikawa1,2, M. Hoshi, Tokai Univ. (Japan)

On the account of new fabrication processes, we demonstrate in this paper that very efficient ways for reducing the 1/f noise in MOSFETs have been achieved. Moreover, a drop down to almost 4 decades can be expected regarding the 1/f0V-1 in the MOSFETs.

E-1: DRAM (Area 4)

13:45 D-1-3

Experimental Observation of Self-Phase Modulation in Channel Waveguides

E. Y. Misumaihara, D. H. Brooks, D. Tada, A. Yoshikawa1,2, M. Hoshi, Osaka Univ., Cornell Univ., PRESTO, Japan Science and Technology Agency, 1WPI Advanced Institute for Materials Research, and 2CREST, Japan Science and Technology Agency (Japan)

We demonstrate spectral broadening of femto-

second pulses by SPM in the ZnGePO4 waveguide. Using this method, we estimate the nonlinear strength parameter and the nonlinear refractive index.

Coffee Break (2F Forum)

14:45 D-1-4

Remarkable Enhancement of Optical Kerr Signal by

Increasing Quality Factor in a GaAs/AlAs Multilayer Cavity

K. Moriho, T. Takahashi, T. Kitada and T. Iwai, Univ. of Tokushima (Japan)

The spectral widths of the laser pulses were tuned to the cavity modes and the Q dependent optical Kerr signal was investigated using GaAs/AlAs multilayer cavity structure. We have revealed that the optical Kerr signal was remarkably enhanced by Q (proportional to Q4) in our cavity.

E-2: Flash Memory 1 (Area 4)

Chairs: T. Endoh (Tokai University)

E. Yang (eMemory Technology Inc.)

14:00 E-1-14

An analysis of Conduction Mechanism and Reliabil-

ity Characteristics of MEMC Capacitor with Single ZrV Layer


In this paper, current transport mechanism and reliability of MEMC capacitor with single zirconium oxide layer is characterized in depth.

E-4: 14:45-16:00

Advanced Silicon Integration Technologies for Lab-on-Chip and Implantable Device Applica-

tions.

Chair: J. Ohta (NAIST)

We set up model and perform simulation of DNA

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translations.

15:00 D-2-2

Development of half-cladding semiconductor photonic device structure for surface transmis-

sion of light waves

N. Yamamoto, D. Mierakawi, H. Fujikai, K. Aki-

hara, M. Kubo, A. Kawanishi, H. Sotobayashi and H. Takah1,2, NICET, Tokyo Denki Univ. and 1Aoyama Gakuin Univ. (Japan)

We propose a half-cladding semiconductor laser (HaCL) structure to achieve a surface transmission of light waves in the novel photonic device. A light emission from the fabricated HaCL structure is suc-

cessfully conducted under the current injection.

F-1: Graphene Structures and Transport (Area 5)

14:00 F-1-13

Field-Effect in Multiple Graphene Layer Struc-

tures

M. Ryzhii1, T. Onogi1, Y. Min6, M. S. Shur1 and Y. Wu2, 1Univ. of Tsukuba, 2Tokyo Inst. of Tech. and 3National Inst. of Materials Technology, Kagurazaka (Japan)

The Ge nanowires are prepared by VLS method. A

sensitive sensors.

15:00 F-2-2

Ge nanowires for nanoscale nonvolatile memory applications

S. Mokkapati, S. Majumdar1, W. Banerjee, S. Mon-

dal, S. Maunul and S. K. Ray2, Chang Gung Univ. and 3Indian Institute of Technology, Kharagpur (India)

The Ge nanowires are prepared by VLS method. A broad peak in photoluminescence spectrum is due to germanium-oxide vacancies. Good flash and resistive memory devices are obtained using Ge nanowire MOS structure for the first time.
RF Signal Generator Based on Time-to-Analog Converter Using Multi-Ring Oscillators in 90-nm CMOS  
K. Nakano, S. Amakura, N. Ishikawa and K. Maru, Tokyo Tech (Japan)  
In this paper, a scalable wideband RF signal generator that uses a time-to-analog conversion technique using multi-ring oscillators is proposed and confirmed by fabricating a chip using 90-nm CMOS.

Luminescence Characteristics and Anisotropic Evaporated AlN Films for Inorganic Electroluminescence Devices  
Inorganic electroluminescence devices have attracted attention owing to their application in low-power-consumption displays. However, the operating voltage is very high. To lower the operating voltage, we have investigated Tb-doped AlN films as the luminescent layer.

Influence of Nitrogen Doping on the LaAlO3 Film Properties  
M. Hongo, N. Komatsu, C. Kimura and H. Aoki, Osaka Univ. (Japan)  
We have investigated the influence on the electrical and optical properties of the LaAlO3 (N: 0-4%) films of nitrogen doping as a way of improving the water resistance.

Growth of Graphene for Electronics Applications (Area 8)  
Chairs: H. Hibino (NTT Basic Res. Labs.) and H. Murakata (Tokyo Tech)  
14:45 G-2-1 Towards Industrial Applications of Graphene Electrodes  
T. Suda, Hong, Samplubson Univ. (Korea)  
We introduce ultra-large (30-inch) synthesis, roll-to-roll transfer, and chemical doping of graphene films showing excellent electrical and physical properties suitable for practical applications.

Inorganic Impurity Interaction in Organic Semiconductor Materials  
Y. Kuroda, N. Terada, K. Toyoda and T. Ueda, Panasonic Corp. (Japan)  
We have investigated the interaction between organic semiconductor materials and inorganic impurities. The results were confirmed by high-performance dye-sensitized solar cells using InP as the anode.

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We illustrate with the organic field-effect transistors decrease of the effective mobility and presence of traps with decrease of the grain size. Accumulation of the defects on the grain boundary is also discussed.

A low power plasma nitridation process to an ultra-thin GeO2 film was proposed to eliminate the degradation induced by ALD A2D3 deposition, without losing the superior MOS interface properties of GeO2/Ge.

The channel direction dependent low field hole mobility characteristics due to the direction dependency of heavy hole effective mass is experimentally observed for pMOS fabricated on the atomically flat silicon (100) orientation surface.

We present the results of design rules and trade offs of the PORGA architecture performance were presented. Frequency triplers at 26GHz spread-spectrum transceiver chipset for Radar using Post-Passivation Interconnection.
of traps with decrease of the grain size. Accumulators decrease of the effective mobility and presence We illustrates with the organic field-effect transis

M. Weis

pentacene thin films

Grain boundary effect on charge transport in

15:30 A-2-3

Semiconductors (Area 10)

In Half a Century of Research Career, What did I Explore?

K. Shimoda, Univ. of Tokyo, Japan

L. Esaki, Yokohama College of Pharmacy / The Science and Technology Promotion Foundation of Ibaraki, Japan

Nagashio

GeO2/Ge.

A low power plasma nitridation process to an ultra

Thermal Desorption Spectroscopy (TDS) Analy-

JST-CREST (Japan)

73

Tohoku Univ. (Japan)

R. Kuroda, A. Teramoto, S. Sugawa and T. Ohmi, National Chiao Tung Univ. (Taiwan)

Experimental Investigation and Modeling for

analyzed experimentally.

a programmable optically reconfigurable gate ar

Programmable optically reconfigurable gate

Characteristics by Using Multi-CSL Architec-

asynchronously developed now. In this paper, we present

Flash

15:25 E-2-3

15:45 J-2-4 (Late News)

Vertically-Aligned ZnO Nanowire Arrays and

Their Application as UV Sensors

W. Mao1, J. Zhou1, P. Gao1, C. Liu1 and Z. L. Wang1, Georgia Inst. of Tech. and Jilin Univ. (USA)

As a direct wide band-gap (3.73 eV) semiconductor with a large excition binding energy (60 meV), ZnO is one of the most important semiconductor materi-

als for applications in optoelectronics, sensors, and actuators. For the known one-dimensional (1D) nanomaterials, ZnO nanowires and nanobelts are among the most promising and most extensively studied 1D nanostuctures due to their interesting properties.

15:45 G-2-4

A 26GHz Transceiver Chipset for Short Range

Radar using Post-Passivation Interconnection

S. Uji1, T. Kawai, K. Kubara, N. Negoro, T. Fu-

buda, H. Sakai, T. Voda and T. Tanaka, Panasonic Corp. (Japan)

26GHz spread-spectrum transceiver chipset for short-range radar fabricated using post-passivation interconnection is presented. Frequency triplers lower the local oscillation frequency, which sup-

press the carrier leakage. Baud in Rx/IC increases the dynamic range.

Graphene forms on 3C-SiC thin films grown on Si substrates by annealing the SiC films in H2V. In this paper, we have conducted cross-sectional TEM measurements on graphene, focusing on the Si sur-

face orientational dependence.

Synthesis of High Quality Graphene Using

Diamond-Like Carbon (DLC) as Solid Carbon

Source

B. Lin1, G. Han1, M. C. Yang1, Q. Zhou1, S. M. Koh1 and Y. C. Yao1, National University of Singapore and Data Storage Institute (Singapore)

We report the first demonstration of synthesis of high quality graphene using Diamond-Like Carbon (DLC) as solid carbon source. DLC thickness, nickel thickness, SiO2 capping layer, and annealing temperature are demonstrated to affect graphene quality.

15:30 H-2-3

Suppression of gate leakage and enhancement of breakdown voltage using ALOx nano particles as gate dielectric for AlGaN/GaN MOS-HEMTs

J. Freedman, T. Kato, A. Watanabe, S. L. Selvaraj and T. Egawa, Nagaoya Inst. of Tech. (Japan)

We have fabricated ALOx nano particles based MOS-HEMT. The MOS-HEMT exhibit good pinch off features with reduced gate leakage and improved breakdown voltage when compared to conventional HEMT. The observed Id max and gm max for MIS-HEMT are 425 mA/mm and 121 mS/mm respecti-

vely.

15:30 I-2-2

In situ Silane Surface Passivation for Gate-First

Undoped AlGaN/GaN HEMTs with Minimum Current Collapse and High-Permittivity Dielec-

trie

S. Liu1, H. C. Chin1, E. K. F. Law1, W. Liu1, L.S. Tan1 and Y. C. Yeo1, National University of Singa-

pore and Inst. of Materials Res. and Engineering

Agency for Sci. Tech. and Res. (Singapore)

An in situ surface passivation technology compris-

ing vacuum anneal and silane treatment was inte-

grated in the fabrication of undoped AlGaN/GaN metal-oxide-semiconductor high electron mobility transistors (MOS-HEMTs). Excellent DC charac-

teristics with minimum current collapse at room temperature were obtained. DC characteristics at high temperatures were also investigated.

15:30 J-2-4

Electronic transport of single-wall carbon nano-

tubes with superconducting contacts

M. Shimizu1, H. Akimoto1 and K. Ishibashi1, RIKEN and Tokyo Univ. of Science (Japan)

We will report our on-going study of the electronic transport properties of the single wall carbon nanotube quantum dot with Al contacts in the high transp-

cency regime and in the intermediate trans-

parency regime (Kondo regime).

15:45 J-2-5 (Late News)

Iridium oxide electrodes with high charge delivery
capacity (CDC), employed in CMOS chips for reti-

nal prosthesis, were fabricated. Relationship of fab-

rication process parameter with CDC was evaluated through electrochemical method. In vivo evaluation was performed using fabricated electrodes, and it confirmed that retinal stimulation was possible.

15:45 L-2-2

Fabrication and in vivo Evaluation of High

Performance Stimulus Electrodes Employed in a

CMOS Chip for Retinal Prosthesis

T. Noda1, S. Tomimatsu, K. Satagawa1, T. Tokuda1, T. Tanaka1, H. Terawara1, K. Niichada1, T. Fujikado1 and J. Ohba1, NAIST, NIDEK Co., Ltd. and Osaka Univ. (Japan)

Special Plenary Session: A Half Century of Esaki Diode and Lasers (Tokyo Dome Hotel)

Special Plenary Session: A Half Century of Esaki Diode and Lasers (Tokyo Dome Hotel)

Chair: Y. Arakawa, Univ. of Tokyo, Japan

17:00 PL-2-1

50 Years of the Laser

K. Shimoda, Univ. of Tokyo, Japan

17:45 PL-2-2

In Half a Century of Research Career, What did I Explore?

L. Esaki, Yokohama College of Pharmacy / The Science and Technology Promotion Foundation of Ibaraki, Japan

18:30-20:00 Reception (Tokyo Dome Hotel)