

2011 INTERNATIONAL IMAGE SENSOR WORKSHOP

Hakodate-Onuma Prince Hotel
June 8-11, 2011 Hokkaido, Japan

PROGRAM

Wednesday, June 8th 2011

08:00-08:30 Registration

Welcome

08:30-08:45 Opening

Session 01 Small Pixel Sensors I

Session chair: Albert Theuwissen (Harvest Imaging)

08:45-09:05 **Pixel Continues to Shrink....Small Pixels for Novel CMOS Image Sensors**

R1 *G. Agranov, S. Smith, R. Mauritzson, S. Chieh, U. Boettiger, X. Li, X. Fan, A. Dokoutchaev, B. Gravelle, H. Lee, W. Qian, R. Johnson. Aptina LLC, USA*

09:05-09:25 **A Review of the 1.4 μm Pixel Generation**

R2 *R. Fontaine. Chipworks, Canada*

09:25-09:45 **SNR Performance Comparison of 1.4 μm Pixel : FSI, Light-guide, and BSI**

R3 *Kyungho Lee, JungChak Ahn, Bumsuk Kim, Taesub Jung, Sangjoo Lee, Moosup Lim, Chang-Rok Moon, Sangil Jung, Junetaeg Lee, Hongki Kim, Duckhyung Lee, Hiroshige Goto, Chi-Young Choi, and Yun-Tae Lee. Samsung Electronics Co., Ltd., Korea*

09:45-10:05 **Pixel-to-Pixel Isolation by Deep Trench Technology: Application to CMOS Image Sensor**

R5 *A. Tournier, F. Leverd, L. Favennec, C. Perrot, L. Pinzelli, M. Gatefait, N. Cherault, D. JeanJean, J.-P. Carrere, F. Hirigoyen, L. Grant, F. Roy. STMicroelectronics, France*

10:05-10:25 **Break**

Session 02 Small Pixel Sensors II

Session chair: Jung Chak Ahn (Samsung)

10:25-10:45 **Quantum Efficiency Simulation Using Transport Equations**

R6 *William Gazeley and Dan McGrath. Aptina Imaging, USA*

10:45-11:05 **Crosstalk Metrics and the Characterization of 1.1 μm -pixel CIS**

R7 *C. Chao, H.Y. Tu, K.Y. Chou, P.S. Chou, F.L. Hsueh, W.H. Wei, R.J. Lin, and B.C. Hsieh. Taiwan Semiconductor Manufacturing Company, Taiwan, ROC*

11:05-11:25 **Back Illuminated Vertically Pinned Photodiode with in Depth Charge Storage**
R9 *J. Michelot^{1,2}, F. Roy¹, J. Prima¹, C. Augier¹, F. Barbier¹, S. Ricq¹, P. Boulenc¹, Z. Essa¹, L. Pinzelli¹, H. Leininger¹, M. Gatefait¹, J.-E. Broquin².*
¹ STMicroelectronics, France; ² IMEP-LAHC, France

11:25-11:45 **The Mass Production of Second Generation 65 nm BSI CMOS Image Sensors**
R10 *H. Rhodes, S. Manabe, V.C.Venezia, K. C. Ku, Z. Lin, P. Fu, D. Tai, A. Shah, R. Liu, R. Yang, P. Matagne, S. Hu. OmniVision Technologies, Inc., USA*

11:45-13:15 **Lunch**

Session 03 Invited Presentation and Process Technology

Session chair: Shou-Gwo Wu (TSMC)

13:15-13:45 **Invited Presentation-I**

I1 **Technology of Color Filter Materials for Image Sensor**

Hiroshi Taguchi, Masashi Enokido. FUJIFILM Electronic Materials Co., Ltd., Japan

13:45-14:05 **Highly Ultraviolet Light Sensitive and Highly Reliable Photodiode with Atomically Flat Si Surface**
R11

Rihito Kuroda, Taiki Nakazawa, Katsuhiko Hanzawa and Shigetoshi Sugawa. Tohoku University, Japan

14:05-14:20 **High Performance and High Yield Junction Formation with Full Device Exposure Laser Thermal Annealing**
R12

K. Huet¹, C. Boniface¹, J. Venturini¹, Z. Ait Fqir Ali-Guerry^{2,3}, R. Beneyton², M.Marty², D. Dutartre², F. Roy². ¹ EXCICO, France; ² STMicroelectronics, France; ³ Institut des Nanotechnologies; France

14:20-14:35 **A Highly Manufacturable Backside Illumination Technology for CMOS Image Sensor**
R13

Yunki Lee, Chang-rok Moon, Doowon Kwon, Jinho Kim, Byoung jun Park, Yuyeon Yu, Gilsang Yoo, Sanghoon Kim, Seunghoon Shin, Taehun Lee and Duckhyung Lee. Samsung Electronics Co. LTD., Korea

14:35-14:55 **Break**

Session 04 Poster Presentations

14:55-17:10 Session chair: Jun Ohta (Nara Institute of Science and Technology)
Lindsay Grant (ST Microelectronics)

P1 **Performance Improvements of Polarization Analyzing CMOS Image Sensor Using Multiple Pixel Array Architecture and 65nm Standard CMOS Process**

Takashi TOKUDA, Hitoshi MATSUOKA, Sanshiro SHISHIDO, Toshihiko NODA, Kiyotaka SASAGAWA and Jun OHTA. Nara Institute of Science and Technology, Japan

- P2 **High Resolution CCD Polarization Imaging Sensor**
Viktor Gruev and Tim York. Washington University, USA
- P4 **A 2/3-type 2.3-Mega Pixel IT-CCD for HD 1080p60**
Takuya Asano, Yoshinori Horikawa, Kazuaki Hirata, Ryoichi Nagayoshi, Akira Tsukamoto. Panasonic Corporation, Japan
- P5 **A High Speed CMOS Dual Line Scan Imager for Industrial Applications**
P. Donegan, L. Korthout, M. Moser, V. Bomm, Y. Lin, A. Kumar, F. Feng, D. Marchesan, D. Verbugt, P. Albertini, W. de Haan, S. Xie, D. Atos, W. Maes, J. de eulmeester, M. Sonder, E. Fox. Teledyne DALSA Corporation, Canada
- P6 **Ageing Effects on Image Sensors: Neutron Irradiation Studies on Wafer and Packaged Devices**
Gayathri G. Nampootheri¹, Albert J. P. Theuwissen^{1,2}. ¹ Delft University of Technology, the Netherlands; ² Harvest Imaging, Belgium
- P7 **Analog Multiplex Bus Readout Method to Reduce Ghosting Image Artifact in CMOS Image Sensors**
Rahul Sankhe, Raja Reddy P. ON Semiconductor Technology India Pvt. Ltd., India
- P8 **Study of Image Artifacts Caused by the Single-Ended CTA Column Comparator Used in CMOS Imagers**
M.D. Purcell, G.G. Storm, J. K Moore, M. Wigley, D. Tolmie. STMicroelectronics, UK
- P9 **Column-Parallel Circuits with Digital Correlated Multiple Sampling for Low Noise CMOS Image Sensors**
Yue Chen¹, Yang Xu¹, Adri J. Mierop² and Albert J.P. Theuwissen^{1,3}. ¹ Delft University of Technology, the Netherlands; ² Teledyne DALSA B.V., the Netherlands; ³ Harvest Imaging, Belgium
- P10 **Post-ADC Digital Filtering in the CIS with the Column Single Slope ADC**
Toshinori Otaka, Takumi Hiraga and Takayuki Hamamoto. Tokyo University of Science, Japan
- P12 **Prototype Line-Scan Device with 12-bit Charge Domain Column-Parallel Successive Approximation ADC**
Laurens Korthout, Daniel Verbugt, Paul Donegan, Adri Mierop. Teledyne DALSA Professional Imaging, The Netherland
- P13 **Analysis of Front-end Multiplexing for Column Parallel Image Sensors**
Daniel Van Blerkom, Steve Huang, Loc Truong and Barmak Mansoorian. Forza Silicon Corporation, USA

- P15 **Accurate Capacitance and RC Extraction Software Tool for Pixel, Sensor, and Precision Analog Designs**
M. Ershov¹, M. Cadjan¹, Y. Feinberg¹, X. Li², G. C. Wan², and G. Agranov². ¹ Silicon Frontline Technology, USA; ² Aptina Imaging, USA
- P16 **Single-Photon Avalanche Diodes in sub-100nm Standard CMOS Technologies**
Mohammad Azim Karami, Hyung-June Yoon, and Edoardo Charbon. Delft University of Technology, Netherlands
- P17 **An Infra-Red Sensitive, Low Noise, Single-Photon Avalanche Diode in 90nm CMOS**
Eric A. G. Webster¹, Justin A. Richardson², Lindsay A. Grant³, David Renshaw¹, Robert K. Henderson¹. ¹ University of Edinburgh, UK; ² University of Edinburgh and Dialog Semiconductor; ³ ST Microelectronics, UK
- P19 **Enhanced X-RAY CMOS Sensor Panel for Radio and Fluoro Application Using a Low Noise Charge Amplifier Pixel with a Partially Pinned PD**
Assaf Lahav¹, Tomer Leitner, Raz Reshef & Amos Fenigstein. ¹ Tower Semiconductor LTD., Israel
- P20 **L²CMOS Image Sensor for Low Light Vision**
Pierre Fereyre, Frédéric Devrière, Stéphane Gesset, Marie Guillon, Thierry Ligozat, Frédéric Mayer, Gareth Powell, Vincent Prevost, Frédéric Ramus, Olivier Seignol. e2v semiconductors, France
- P21 **Color Channel Weights in a Noise Evaluation**
Samu Koskinen, Eero Tuulos, Juha Alakarhu. Nokia, Finland
- P22 **Design and Preliminary Evaluation of CMOS Image Sensor with Pseudorandom Pixel Placement**
Junichi Akita, Yui Maeda, Akio Kitagawa. Kanazawa University, Japan
- P24 **Photo-Sensitive Area Modulation Pixel for 3D Real-Time CCD Imager**
Y. Hashimoto, F. Kurihara, K. Murakami, K. Imai, K. Taniguchi¹. Matsushita Electric Works, Ltd., Japan; ¹ Osaka University, Japan
- P25 **CMOS Image Sensor for 3-D Range Map Acquisition Using Time Encoded 2-D Structured Pattern**
Hiroki Yabe, Makoto Ikeda. University of Tokyo, Japan
- P27 **An Integration Time Prediction Based Algorithm for Wide Dynamic Range 3D-Stacked Image Sensors**
Adi Xhakoni¹, David San Segundo Bello², Koen De Munck², Padmakumar Ramachandra Rao², Piet De Moor² and Georges Gielen¹. ¹ K.U.Leuven, Belgium; ² IMEC, Belgium

- P28 **A QCIF 145dB Imager For Focal Plane Processor Chips Using a Tone Mapping Technique in Standard 0.35 μ m CMOS Technology**
S. Vargas-Sierra, G. Liñán-Cembrano, A. Rodríguez-Vázquez. CSIC and Universidad de Sevilla, Spain
- P29 **Temperature Compensation Scheme for Logarithmic CMOS Image Sensor**
Hakim Zimouche, Hawraa Amhaz and Gilles Sicard. CNRS, France
- P30 **Smart Readout Technique based on Temporal Redundancies Suppression Designed for Logarithmic CMOS Image Sensor**
Hawraa AMHAZ, Hakim ZIMOUCHE and Gilles SICARD. CNRS, France
- P31 **Backside Illuminated Hybrid FPA Achieving Low Cross-Talk Combined with High QE**
Koen De Munck, Padmakumar Rao Ramachandra, Kiki Minoglou, Joeri De Vos, Deniz Sabuncuoglu and Piet De Moor. IMEC, Belgium
- P32 **Backside Illuminated CMOS Snapshot Shutter Imager on 50 μ m Thick High Resistivity Silicon**
Stefan Lauxtermann, Dirk Leipold. Sensor Creations., Inc., USA
- P33 **CMOS Image Sensor with an Overlaid Organic Photoelectric Conversion Layer: Optical Advantages of Capturing Slanting Rays of Light**
Mikio Ihama, Hiroshi Inomata, Hideki Asano, Shinji Imai, Tetsuro Mitsui, Yuuki Imada, Masayuki Hayashi, Takashi Gotou, Hideyuki Suzuki, Daigo Sawaki, Mitsumasa Hamano, Toshihiro Nakatani, Yasuyoshi Mishima. FUJIFILM Corporation, Japan
- P34 **The Gigavision Camera - A 2Mpixel Image Sensor with 0.56 μ m² 1-T Digital Pixels**
HyungJune Yoon and Edoardo Charbon. Delft University of Technology, The Netherlands
- P35 **Low Noise High Dynamic Range 2.3Mpixel CMOS Image Sensor Capable of 100Hz Frame Rate at Full HD Resolution**
Paul Vu, Boyd Fowler, Steve Mims, Chiao Liu, Janusz Balicki, Hung Do, Wang Li, Jeff Appelbaum. Fairchild Imaging, Inc., USA

17:10- **Poster Viewing**

Thursday, June 9th 2011

Session 05 Time-of-Flight and Time-Resolved Imaging
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Session chair: Pierre Magnan (ISAE)

08:30-08:45 **Experimental Comparison of Four Different CMOS Pixel Architectures Used in Indirect Time-of-Flight Distance Measurement Sensors**

R15

D. Durini, A. Spickermann, J. Fink, W. Brockherde, A. Grabmaier, B. J. Hosticka. Fraunhofer Institute for Microelectronic Circuits and Systems, Germany

08:45-09:05 **Time Of Flight Image Sensors in 0.18 μ m CMOS Technology: a Comparative Overview of Different Approaches**
R16

David Stoppa¹, Lucio Pancheri¹, Nicola Massari¹, Mattia Malfatti¹, Matteo Perenzoni¹, Gianmaria Pedretti¹, Gian-Franco Dalla Betta².¹ Fondazione Bruno Kessler, Italy; ² DISI, University of Trento, Italy

09:05-09:20 **Dark Current Suppression during High Speed Photogate Modulation for 3D ToF Imaging Pixel**
R17

Tae-Yon Lee¹, YongJeI Lee¹, Dong-Ki Min¹, Joonho Lee¹, Young-Gu Jin¹, Yoondong Park¹, and Chilhee Chung¹, Ilia Ovsianikov² and Eric R. Fossum^{1,2}.¹ Samsung Electronics, South Korea; ² Samsung Semiconductor Inc., USA

09:20-09:35 **Hybrid Back-Side Illuminated Distance Measuring Sensor Array with Ring Gate Structure**
R18

Mitsuhito Mase, Takashi Suzuki, Shigeyuki Nakamura, Michito Hirayanagi, Naoto Sakurai, Terumasa Nagano, Atsushi Ishida, Seiichiro Mizuno and Mitsutaka Takemura. Hamamatsu Photonics K.K., Japan

09:35-9:50 **High-Speed General Purpose Demodulation Pixels Based on Buried Photodiodes**
R20

Lysandre - Edouard Bonjour^{1,2}, Thomas Baechler¹, Maher Kayal².¹ CSEM SA, Switzerland; ² EPFL STI IEL GR - KA, Switzerland

9:50-10:10 **A CMOS Image Sensor with Draining Only Modulation Pixels for Sub-Nanosecond Time-Resolved Imaging**
R21

Shoji Kawahito, Zhuo Li and Keita Yasutomi. Shizuoka University, Japan

10:10-10:30 **Break**

Session 06 Invited Presentation and Various Imager Design Topics

Session chair: Johannes Solhusvik (Aptina Norway)

10:30-11:00 **Invited Presentation-II**

I2 **New Application Areas Made Possible by High Speed Vision**

Masatoshi Ishikawa. University of Tokyo, Japan

11:00-11:15 **A Multi-Functional Imager for TOF and High Performance Video Applications Using a Global Shuttered 5 μ m Cmos Pixel.**
R22

Peter Centen¹, Juul v.d Heijkant¹, Jeroen Rotte¹, Klaas Jan Damstra¹, Assaf Lahav², Adi Birman², Steffen Lehr³, Sabine Roth³, Ruud van Ree¹.¹ Grass Valley, Netherlands; ² TowerJazz, Israel; ³ Viimagic, Germany

11:15-11:30 **Backside Thinned, 2.5 e⁻_{RMS}, BSI, 700fps, 1760x1760 Pixels Wave-Front Imager with 88 Parallel LVDS Output Channels**
R23

Bart Dierickx¹, Benoit Dupont¹, Arnaud Defernez¹, Martin Fryer², Paul Jorden², Andrew Walker², Andrew Pike², Paul Jerram², Jerome Pratlong².¹ Caeleste, Belgium; ² e2v, UK

11:30-11:50 **CCD and CMOS Combined, Low Noise and Low Power Dissipation Linear Image Sensor with Variable Charge Mixing Mode**
R24

Makoto Monoi¹, Masayuki Ohki³, Yoshihiro Hayakawa³, Syu Sasaki².¹ Toshiba Corporation, Japan; ² Iwate TOSHIBA electronics, Japan; ³ Toshiba micro-electronics, Japan

11:50-12:05 **An Implantable CMOS Image Sensor with Light Guide Array Structure and Fluorescent Filter**
R25

Kiyotaka Sasagawa^{1,2}, Keisuke Ando¹, Takuma Kobayashi^{1,2}, Toshihiko Noda^{1,2}, Takashi Tokuda^{1,2}, Yumiko Hatanaka^{1,2}, Hideki Tamura^{1,2}, Sadao Shiosaka^{1,2}, Jun Ohta^{1,2}.¹ Nara Institute of Science and Technology, Japan; ² Japan Science and Technology Agency, Japan

12:05-12:20 **An Autonomous micro-Digital Sun Sensor Implemented with a CMOS Image Sensor Achieving 0.004° Resolution @ 21mW**
R26

Ning Xie¹, Albert J.P. Theuwissen^{1,2}, Bernhard Büttgen^{1,3}.¹ Delft University of Technology, Netherlands; ² Harvest Imaging, Bree, Belgium; ³ MESA Imaging, Switzerland

12:20-13:50 **Lunch**

Session 07	Noise
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	Session chair: Boyd Fowler (Farichild Imaging)
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13:50-14:10 **New Source of Random Telegraph Signal in CMOS Image Sensors**

R27 *V. Goiffon¹, P. Magnan¹, P. Martin-Gonthier¹, C. Virmontois¹, and M. Gaillardin².¹ ISAE, France; ² CEA DAM-DIF, France*

14:10-14:25 **Analysis of Blinking Pixels in CCD Imagers with and without Surface Pinning**

R28 *Inge Peters, Erik Bogaart^{*}, Erik-Jan Manoury, Adri Mierop, Jan Bosiers. TELEDYNE DALSA Professional Imaging, the Netherlands; ^{*} ASML, the Netherlands*

14:25-14:45 **Dark Fixed Pattern Noise Generation by Negative-Bias-Temperature (NBT) Stress on CMOS Imager Pixel Transfer Gate**
R29

Hirofumi Yamashita, Motohiro Maeda, Shogo Furuya, Takanori Yagami. Toshiba Corporation, Japan

14:45-15:00 **5MPix, 30fps CMOS Image Sensor with Very Low Temporal Line Noise**

R30 *G.G. Storm, M.D. Purcell, J. K Moore, M. Wigley, D. Tolmie, L.A Grant. STMicroelectronics, UK*

15:00-15:15 **4T CMOS Image Sensor Pixel Degradation due to X-ray Radiation**

R31 *Jiaming Tan¹, Bernhard Büttgen¹ and Albert J. P. Theuwissen^{1,2}.¹ Delft University of Technology, the Netherlands; ² Harvest Imaging, Belgium*

15:15-15:35 **Break**

Session 08 Stacked Structures, High Dynamic Range Sensors, and CCDs

Session chair: Koichi Mizobuchi (Olympus Medical Systems)

15:35-15:50 Investigation of Two-Layer Photodetectors for YSNR10 Improvement in Submicron Pixels
R32*Eric R. Fossum. Samsung Electronics Semiconductor R&D Center, South Korea and Thayer School of Engineering at Dartmouth, USA***15:50-16:05 A 128 x 96 Pixel Stack-Type Color Image Sensor with B-, G-, R-sensitive Organic Photoconductive Films**
R33*Hokuto Seo^{1*}, Satoshi Aihara¹, Toshihisa Watabe¹, Hiroshi Ohtake¹, Toshikatsu Sakai¹, Misao Kubota¹, Norifumi Egami¹, Takahiro Hiramatsu², Tokiyoshi Matsuda², Mamoru Furuta², and Takashi Hirao². ¹ NHK, Japan; ² Kochi University of Technology, Japan***16:05-16:25 Process Integration Aspects of Back Illuminated CMOS Imagers Using Smart Stacking™ Technology with Best in Class Direct Bonding**
R34*Ruth Shima Edelstein¹, Omer Katz¹, Becky Lavi¹, Ishai Aberman¹, Sagee Rosenthal¹, Michal Shadmi¹, Shay Arad¹, Nili Golan¹, Michal Shach Caplan¹, Morad Massalha¹, Chrystelle Lagahe-Blanchard², Laurent Marinier², Richard Fontanière², Arnaud Castex², Marcel Broekaart², Muriel Martinez², Nathalie Milhet², Arnaud Rigny², Christine Pelissier². ¹ TowerJazz, Israel; ² SOITEC, France***16:25-16:40 A 768x576 Logarithmic Image Sensor with Photodiode in Solar Cell mode**
R35*Yang Ni, YiMing Zhu, Bogdan Arion. New Imaging Technologies SA, France***16:40-16:55 An 89dB Dynamic Range CMOS Image Sensor with Dual Transfer Gate Pixel**
R36*Xinyang Wang, Bram Wolfs, Guy Meynants, Jan Bogaerts. CMOSIS N.V, Belgium***16:55-17:15 A 1080 HD Ready 1/2.33-type 12M Pixel CCD Image Sensor with Dual Channel Horizontal CCD**
R38*Koichi Yonemura, Toshihumi Habara, Hirokazu Shiraki, Yoshiaki Sato, Akira Tsukamoto. Panasonic Corporation, Japan*

17:15-17:30 break

Session 09 Invited Presentation-III

Session chair: Shoji Kawahito (Shizuoka University)

17:30-18:00 The 25th Anniversary of IISW: Reflections on Directions
I3*Eric R. Fossum. ImageSensors, Inc., USA*

Friday, June 10th 2011

Session 10 Invited Presentation and Avalanche Diode Sensors
Session chair: Shigetoshi Sugawa (Tohoku University)
Satoshi Aihara (NHK)

08:30-09:00 **Invited Presentation-IV**

I4 **Single Photon Imaging**

Peter Seitz. CSEM, Switzerland and EPFL STI IMT NE, Switzerland

09:00-09:20 **Single Photon Avalanche Diodes in 90nm CMOS Imaging Technology with sub-1Hz Median Dark Count Rate**

R39

*Eric. A. G. Webster¹, Justin Richardson¹, Lindsay Grant², Robert K. Henderson¹.
¹ The University of Edinburgh, UK; ² STMicroelectronics, UK*

09:20-09:40 **A 32x32 SPAD Pixel Array with Nanosecond Gating and Analog Readout**

R40

Lucio Pancheri, Nicola Massari, Fausto Borghetti and David Stoppa. Fondazione Bruno Kessler, Italy

09:40-10:00 **A Time-Gated 128X128 CMOS Spad Array for On-Chip Fluorescence Detection**

R41

Y. Maruyama and E. Charbon. Delft University of Technology, the Netherlands

10:00-10:15 **3D Near-Infrared Imaging Based on a SPAD Image Sensor**

R42

*Juan Mata Pavia^{1,2}, Cristiano Niclass¹, Claudio Favi¹, Martin Wolf²,
Edoardo Charbon^{1,3}. ¹ Ecole Polytechnique Fédérale de Lausanne, Switzerland;
² University Hospital Zürich, Switzerland; ³ TU Delft, Netherlands*

10:15-10:30 **185 MHz Count Rate, 139 dB Dynamic Range Single-Photon Avalanche Diode with Active Quenching Circuit in 130 nm CMOS Technology**

R43

*Andreas Eisele^{1,2}, Robert Henderson³, Bernd Schmidtke², Tobias Funk²,
Lindsay Grant⁴, Justin Richardson^{3,5}, Wolfgang Freude^{1,6}. ¹ IPQ, Karlsruhe
Institute of Technology, Germany; ² Robert Bosch GmbH, Germany; ³ The
University of Edinburgh, UK; ⁴ STMicroelectronics Imaging Division, UK; ⁵ Dialog
Semiconductor Ltd., UK; ⁶ IMT, Karlsruhe Institute of Technology, Germany*

10:30-10:45 **A Disdrometer Based on Ultra-Fast SPAD Cameras**

R44

*A. Berthoud¹, S. Burri¹, C. Bruschini¹, A. Berne¹, and E. Charbon^{1,2}. ¹ EPFL,
Switzerland; ² Delft University of Technology, the Netherlands*

10:45-11:05 **Break**

Session 11 Large Area Sensors and Xray Sensors

Session chair: Bart Dierickx (Caeleste)

11:05-11:25 A 300mm Wafer-Size CMOS Image Sensor for Low-Light-Level ImagingR45 *Hidekazu Takahashi, Yuichiro Yamashita, Shin Kikuchi, Masato Fujita, Satoshi Hirayama, Taikan Kanou, Sakae Hashimoto, Kazuyuki Shigeta, Takashi Aoki, Genzo Momma, Shunsuke Inoue. Canon INC., Japan***11:25-11:40 A 23 x 25.9cm² RGB color CMOS Imager System for Digital Photography**R46 *Hein Loijens, Bart Dillen, Wasim Muhammad, Daniel Verbugt, Laurens Korthout, Peter te Vaarwerk, Auke van der Heide, Leon Ponjee, Kim Theuwissen, Piet Jansen, Frank Polderdijk, Jan Bosiers. DALSA Professional Imaging, the Netherlands***11:40-11:55 A 61mmx63mm, 16Million Pixels, 40 Frames per Second, Radiation-Hard CMOS Image Sensor for Transmission Electron Microscopy**R47 *N. Guerrini¹, R. Turchetta¹, G. Van Hoften², A. R. Faruqi³, G. McMullan³, R. Henderson³. ¹ Rutherford Appleton Laboratory, UK; ² FEI, the Netherlands; ³ MRC Laboratory of Molecular Biology, UK***11:55-12:10 Color X-ray Photon Counting Image Sensing**R48 *Bart Dierickx^{1,2}, Benoit Dupont^{1,3}, Arnaud Defernez¹, Nayera Ahmed¹. ¹ Caeleste, Belgium; ² V.U.B., Belgium; ³ Université Paris XIII, France***12:10-12:25 Single Grain TFTs and Lateral Photodiodes for Large Area X-ray Detection**R50 *A. Arslan, R. Ishihara, C.I.M. Beenakker. Delft University of Technology, the Netherlands*12:25-14:00 **Lunch**14:00-18:00 **Social Event**18:00-20:00 **Dinner/WKA/Best Poster Award****Saturday, June 11th 2011****Session 12 Global Shutter Sensors**

Session chair: Daniel Van Blerkom (Forza Silicon)

08:30-08:50 Backside Illuminated Global Shutter CMOS Image SensorsR51 *Guy Meynants, Jan Bogaerts, Xinyang Wang, Guido Vanhorebeek. CMOSIS nv., Belgium*

- 08:50-09:10 **A 1.2MP 1/3" Global Shutter CMOS Image Sensor with Pixel-Wise Automatic Gain Selection**
R53
Johannes Solhusvik¹, Sergey Velichko², Trygve Willassen¹, Sohrab Yaghmai¹, Jenny Olsson¹, Anders Rosnes¹, Tore Martinussen¹, Per Olaf Pahr¹, Siri Eikedal¹, Steve Shaw³, Ranjit Bhamra³, Dan Pates², Scott Smith², Lingtao Jiang², David Wing², Jenny Bai², Satyadev Nagaraja², Ajaya Chilumula². ¹ Aptina, Norway; ² Aptina, USA; ³ Aptina, UK
- 09:10-09:25 **A Low Noise Low Power Global Shutter CMOS Pixel Having Single Readout Capability And Good Shutter Efficiency.**
R54
Yannick De Wit, Tomas Geurts. ON Semiconductor, Belgium
- 09:25-9:40 **Dark Current Characterization of CMOS Global Shutter Pixels using Pinned Storage Diodes**
R55
Keita Yasutomi, Yusuke Sadanaga, Taishi Takasawa, Shinya Itoh, Shoji Kawahito. Shizuoka University, Japan
- 9:40-9:55 **A Common Gate Pinned Photodiode Pixel**
R56
Yannick De Wit, Manuel Innocent. On Semiconductor, Belgium
- 9:55-10:15 **Break**

Session 13 High-Speed and ADC Techniques

Session chair: Tetsuo Nomoto (Sony) Inge Peters (Dalsa)
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- 10:15-10:30 **Progress of Ultra-high-speed Image Sensors with In-situ CCD Storage**
R57
T. G. Etoh¹, V. T. S. Dao¹, H. D. Nguyen¹, K. Fife², M. Kureta³, M. Segawa³, M. Arai⁴ and T. Shinohara⁴. ¹ Kinki University, Japan; ² Ubixum Inc, USA; ³ JAEA, Japan; ⁴ J-PARC, Japan
- 10:30-10:45 **Design of a PTC-Inspired Segmented ADC for High Speed Column Parallel CMOS Image Sensor**
R58
Steven Huang, Ramy Tantawy, Sinh Lam, Daniel Van Blerkom and Barmak Mansoorian. Forza Silicon Corporation, USA
- 10:45-11:00 **A 26.2Mpixel, 74fps, Global Shutter CMOS Imager with 20Gb/s Interface for Multi Object Monitoring**
R59
Cedric Esquenet, John Compitet, Tim Blanchaert, Tomas Geurts, Joost Decupere. ON Semiconductor, Belgium
- 11:00-11:15 **High Speed 36 Gbps 12Mpixel global pipelined shutter CMOS image sensor with CDS**
R60
Jan Bogaerts, Koen Ruythooren, Aleksandar Gvozdenovic, Kevin Van Esbroeck, Bart Ceulemans, Werner Ogiers, Gavrill Arsinte, Xinyang Wang, Guy Meynants CMOSIS nv, Belgium

11:15-11:30 **A High-Speed Low-Noise CIS with 12b 2-stage Pipelined Cyclic ADCs**

R61 *Jong-Ho Park¹, Satoshi Aoyama¹, Takashi Watanabe¹, Tomohiko Kosugi¹, Zheng Liu¹, Tomoyuki Akahori¹, Masaaki Sasaki¹, Keigo Isobe¹, Yuichi Kaneko¹, Kazuki Muramatsu¹, Tetsuya Iida¹ and Shoji Kawahito^{1,2}. ¹ Brookman Technology, Inc., Japan; ² Shizuoka University, Japan*

11:30-11:50 **A 33 Mpixel, 120 fps CMOS Image Sensor for UDTV Application with Two-stage Column-Parallel Cyclic ADCs**

R62 *K. Kitamura¹, T. Watabe¹, Y. Sadanaga², T. Sawamoto², T. Kosugi³, T. Akahori³, T. Iida³, K. Isobe³, T. Watanabe³, H. Shimamoto¹, H. Ohtake¹, S. Aoyama³, S. Kawahito², and N. Egami¹. ¹ NHK, Japan; ² Shizuoka University, Japan; ³ Brookman Technology, Inc., Japan*

11:50-12:10 **A 17.7Mpixel 120fps CMOS Image Sensor with 34.8Gb/s Readout**

R63 *Takayuki Toyama¹, Koji Mishima¹, Hiroyuki Tsuchiya¹, Tatsuya Ichikawa¹, Hiroyuki Iwaki¹, Yuji Gendai¹, Hirotaka Murakami¹, Kenichi Takamiya², Hiroshi Shiroshita¹, Noriyuki Fukushima¹. ¹ Sony, Japan; ² Sony LSI Design, Japan*

12:10-12:15 **Closing Remarks**