



IISW23 Technical Programme

Monday 22nd May

Workshop Welcome and Introduction

Monday 22nd May 8:45am

Session 1: 3D Stacking and Small Pixels

Monday 22nd May 9am

Session Chair: Calvin Chao (TSMC)

R1.1, Trends and Developments in State-of-the-Art CMOS Image Sensors,

Presenter: *John H.F. Scott-Thomas (TechInsights)*

R1.2, High Full Well Capacity and Low Noise Characteristics in 0.6 μm Pixels via Buried Sublocal Connections in a 2-Layer Transistor Pixel Stacked CMOS Image Sensor,

Presenter: *Masataka Sugimoto (Sony Semiconductor Solutions)*

R1.3, World smallest 200Mp CMOS Image Sensor with 0.56 μm pixel equipped with novel Deep Trench Isolation structure for better sensitivity and higher CG,

Presenter: *Sungsoo Choi (Samsung Electronics)*

R1.4, 0.56 μm -pitch CMOS Image Sensor for High Resolution Applications,

Presenter: *Chun Yung Ai (Omnivision)*

R1.5, 0.64 μm 200 Mp Stacked CIS with Switchable Pixel Resolution,

Presenter: *Minho Kwon (Samsung Electronics)*

R1.6, Image sensor family with 1.40 μm pixel, 10ke- LFW, NIR-enhanced QE, dual gain readout, and low power consumption,

Presenter: *Vladi Korobov (ON Semiconductor)*

Session 2: Noise

Monday 22nd May 11am

Session Chair: Manlyun Ha (DB Hitek)

R2.1, Hot Carrier Injection Induced Random Telegraph Noise Degradation in a 0.8um-pitch 8.3Mpixel Stacked CMOS Image Sensor,

Presenter: *Calvin Y Chao (TSMC)*

R2.2, Gate Oxide Benchmarking For Low Frequency Noise Improvement On 3D Stacked CMOS Image Sensors,

Presenter: *Maria M Gouveia da Cunha (STMicroelectronics and ISAE-Supaero)*

R2.3, Exploring Space-Radiation Induced Dark Signal and Random-Telegraph-Signal in a Sony IMX219 CMOS Image-Sensor,

Presenter: *Aubin Antonsanti (ISAE SUPAERO)*

R2.4, Low Temperature Lag-induced FPN of Dual Transfer Global Shutter Pixels under Low Illumination Conditions,

Presenter: *Xiaoliang Ge (Gpixel)*

R2.5, Reduction of RTS noise by optimizing fluorine implantation in CMOS image sensor,

Presenter: *Sungsoo Choi (Samsung Electronics)*

R2.6, Dark Current Compensation of a CMOS Image Sensor by Using In-Pixel Temperature Sensors,

Presenter: *Accel Abarca (INL - International Iberian Nanotechnology Laboratory)*

Session 3: Pixel Design & Process Technology

Monday 22nd May 1:30pm

Session Chair: Bumsuk Kim (Samsung Electronics)

R3.1, 0.6µm F-DTI based Quad-cell with Advanced Optic Technology for All-pixel PDAF and High Sensitivity/SNR Performance,

Presenter: *Junsik Lee (Samsung Electronics)*

R3.2, Low-noise 3-D Bending Pixel Transistor for Small Pixel CMOS Image Sensors Applications,

Presenter: *Kyoung eun Chang (Samsung Electronics)*

R3.3, Near-infrared sensitivity enhancement of silicon image sensor with wide incident angle,

Presenter: *Atsushi Ono (Shizuoka University)*

R3.4, Light Intensity and Charge Holding Time Dependence of Pinned Photodiode Full Well Capacity,

Presenter: *Ken Miyauchi (Brillnics Japan Inc.)*

R3.5, Improved QE in CMOS image sensors with nano-black antireflection layer,

Presenter: *Martin Prest (The Open University)*

R3.6, A customized 110nm CMOS process for large-area radiation detection and imaging,

Presenter: *Lucio Pancheri (University of Trento)*

Posters & Flash Presentations

Monday 22nd May, 3pm Flash Presentations followed by 5pm Poster Session

Session Chairs: Pierre Magnan (ISAE-SUPAERO) & Francois Roy (STMicroelectronics)

P1, A 607MHz time-compressive computational pseud-dToF CMOS image sensor,

Presenter: *Pham N Anh (Shizuoka University)*

P2, Histogram-free direct time-of-flight imaging based on a machine learning processor on FPGA,

Presenter: *Tommaso Milanese (EPFL)*

P3, A 9-shared 3x3 Nonacell Image Sensor with 0.64 μ m unit pixels for Read Noise and Low-illuminance SNR enhancement,

Presenter: *Wonchul Choi (Samsung Electronics)*

P4, Light-Emission Crosstalk Model and Dynamic Correction Algorithm for Large-Scale SPAD Image Sensors,

Presenter: *Ayman Abdelghafar (Canon)*

P5, Optimal biasing and physical limits of DVS event noise,

Presenter: *Rui Graca (Institute of Neuroinformatics - UZH and ETH Zurich)*

P6, Metasurface-based planar microlenses for SPAD pixels,

Presenter: *Martin Lepers (STMicroelectronics/CEA Leti)*

P7, Flexible Spectrally-Scanning Snapshot Multispectral Imaging On Dual-Tap Coded-Exposure-Pixel CMOS Image Sensors,

Presenter: *Roberto Silva (University of Toronto)*

P8, A SPAD-based linear sensor with in-pixel temporal pattern detection for interference and background rejection with smart readout scheme,

Presenter: *Alessandro Tontini (University of Trento)*

P9, Count-Free Histograms with Race Logic for Single-Photon LiDAR,

Presenter: *Atul N Ingle (Portland State University)*

P10, A Study on Two Step Reset LOFIC Pixel to Reduce SNR Gap,

Presenter: *Kazuki Tatsuta (Research Organization of Science and Engineering Ritsumeikan University)*

P11, High Precision direct-ToF Ranging using CMOS SPAD and Ultra-short Pulsed Laser,

Presenter: *Tsai-Hao Hsu (National Yang Ming Chiao Tung University)*

P12, High-speed, super-resolution 3D imaging using a SPAD dToF sensor,

Presenter: *German Mora Martin (University of Edinburgh)*

P13, Self-Powered Ambient Light Sensor Using Energy Harvesting Pixels and Zero Power Communication.,

Presenter: *Benjamin Sarachi (ST Microelectronics)*

P14, An Efficient Direct Time-of-Flight (dToF) LiDAR System Based on High Resolution SPAD Array,

Presenter: *Tze Ching Fung (Samsung Semiconductor Inc.)*

P15, SLIM: Small and Learnable Image Signal Processing Module for CMOS and Quanta Image Sensors,

Presenter: *Stanley H. Chan (DeepLux Technology Inc.)*

P16, Cyber Security for CMOS Image Sensors,

Presenter: *Boyd A Fowler (OmniVision Technologies)*

P17, A CMOS Image Sensor With 1.6 μ s Conversion Time 10-bits Column-Parallel Hybrid ADC Using Self-Adaptive Charge-Injection Cell,

Presenter: *Chih-Cheng Hsieh (National Tsing Hua University)*

P18, Charge Demultiplexing for an Ultra-High-Speed Charge-Domain CMOS TDI Image Sensor with a multi-MHz Line Rate,

Presenter: *Suzy Patchett (Teledyne DALSA)*

P19, Detecting Short-wavelength Infrared Photons by Schottky-barrier based Single Photon Avalanche Diode in 180-nm CMOS Technology,

Presenter: *Chun-Hsien Liu (National Yang Ming Chiao Tung University)*

P20, A Burst Mode 20Mfps Low Noise CMOS Image Sensor,

Presenter: *Xin Yue (Dartmouth College)*

P21, Towards Infrared Spectral Extension of CMOS Image Sensors,

Presenter: *Kaitlin M Anagnost (Dartmouth College)*

P22, Chip-level Performance Analysis using Test Element Group Devices for indirect Time-of-Flight CMOS Image Sensor,

Presenter: *Seunghyun Lee (Samsung Electronics)*

P23, Silicon Metalens for a fully Silicon integrated iTOF SWIR sensors,

Presenter: *Matthieu J.o. Dupre (Qualcomm Technologies Inc.)*

P24, Toward a Photon Counting Detector for X-ray Imaging by Direct Deposition of Scintillator on 32x32 CMOS SPAD Array,

Presenter: *Jau Yang Wu (Electrical Engineering Program C, Yuan Ze University)*

P25, Feedback Control of a Block-Wise-Controlled Image Sensor Based on Brightness Distribution Analysis,

Presenter: *Kohei Tomioka (NHK STRL)*

P26, Analysis of Backside Illuminated CMOS pixels' Quantum Efficiency under Ultraviolet Illumination,

Presenter: *Nour Fassi (STMicroelectronics - ISAE SUPAERO)*

P27, Near Infrared Quantum Efficiency Simulations for CMOS Image Sensors,

Presenter: *Erez Tadmor (onsemi)*

P28, Metasurface-based planar microlenses integrated on Back-Side Illuminated CMOS pixels,

Presenter: *Martin LEPERS (STMicroelectronics)*

P29, A hybrid, back-illuminated image sensor for high QE visible and infrared detection,

Presenter: *Renato AD Turchetta (IMASENIC)*

P30, On-chip narrow angle filter development,

Presenter: *Amos Fenigstein (Tower semiconductor)*

P31, Correlations between DCR and PDP of SPAD integrated in a 28 nm FD-SOI CMOS Technology,

Presenter: *Francis CALMON (INSA Lyon - INL)*

P32, A new digital pixel for particle detection,

Presenter: *Nicola Massari (Fondazione Bruno Kessler)*

P33, A Study on a Feature Extractable CMOS Image Sensor for Low-Power Image Classification System,

Presenter: *Shunsuke Okura (Ritsumeikan Univ.)*

P34, Temporal Noise Suppression Method using Noise Bandwidth Limitation for Pixel-Level Single-Slope ADC,

Presenter: *Sanggwon Lee (Samsung Electronics Co., Ltd.)*

P35, The source-to-gate capacitance of the in-pixel source follower: a positive feedback during charge sensing which increases column settling time and noise voltage.,

Presenter: *Peter G Centen (PeerImaging)*

P36, A Charge pump based TDI accumulator for CMOS Image Sensors,

Presenter: *Rahul Kumar Singh (IIT Delhi)*

P37, Understanding 3D imaging performance in sensors with angle-sensitive pixels,

Presenter: *Pascal Gregoire (Airy3D)*

P38, A SPAD based TAC Pixel with Logarithmic and Linear Multi-mode Operation for Compressed LiDAR Ranging by Direct ToF Measurement,

Presenter: *Kapil Jainwal (Indian Institute of Technology Bhilai)*

P39, A back-illuminated full-frame low-noise HDR 8 μ m, 12Mpixel, 34fps image sensor for industrial, medical and scientific applications,

Presenter: *Adria Bofill-Petit (IMASENIC)*

P41, Front- / Backside Illuminated Low Noise Embedded CCD image sensor with Multi Level Anti Blooming functionality,

Presenter: *Olaf M. Schrey (Fraunhofer Institute of Microelectronic Circuits and Systems)*

P42, High Dynamic Range Pinned Photodiode Pixel with Floating Gate Readout and Dual Gain,

Presenter: *Konstantin Stefanov (The Open University)*

P43, Ultra-sensitive CMOS image sensor capable of operating down to 200 ulx at 60 fps,

Presenter: *Pierre Fereyre (Teledyne e2v)*

P44, Evolution of a 4.6 μ m, 512 \times 512, ultra-low power stacked digital pixel sensor for performance and power efficiency improvement,

Presenter: *Rimon Ikeno (Brillnics Japan Inc.)*

P40 Withdrawn

Tuesday 23rd May

Session 4: HDR and Automotive

Tuesday 23rd May 8:45am

Session Chair: Jan Bogaerts (Gpixel)

R4.1, A 3.0 μ m-pixels and 1.5 μ m-pixels combined CMOS Image Sensor for Viewing and Sensing applications with 106dB Dynamic Range, High-Sensitivity, LED-Flicker Mitigation and Motion Blur-less,
Presenter: *Satoko Iida (Sony Semiconductor Solutions)*

R4.2, Automotive CMOS Image Sensor Family with 2.1 μ m LFM pixel, 150 dB Dynamic Range and High Temperature Stability,
Presenter: *Manuel Innocent (onsemi)*

R4.3, Automotive 2.1 μ m Full-Depth Deep Trench Isolation CMOS Image Sensor with a Single-Exposure Dynamic-Range of 120 dB,
Presenter: *Dongsuk Yoo (Samsung Electronics)*

R4.4, 110dB High Dynamic Range Continuous Non-Uniform TTS and Linear ADC Scheme Using A 4.6 μ m Stacked Digital Pixel Sensor,
Presenter: *Toshiyuki Isozaki (Brillnics Japan Inc.)*

R4.5, A 5MPixel Image Sensor with 3.45 μ m Dual Storage Global Shutter BSI Pixel with 90dB DR,
Presenter: *Tomas Geurts (Omnivision)*

R4.6, A High Dynamic Range APS-C Sized 8K 120-fps Stacked CMOS Image Sensor,
Presenter: *Wesley Cotteleer (GPixel)*

Session 5: Smart and Event-based Imagers

Tuesday 23rd May 10:45am

Session Chair: Vladi Korobov (On Semiconductor)

R5.1, A 90dB single-shot HDR, 0.5MP global-shutter image sensor with NIR QE enhancement, 20mW power consumption and smart event detection modes,
Presenter: *Adi Xhakoni (ams OSRAM)*

R5.2, An InGaAs Multi-Functional Fast SWIR Imager with Event-based and Laser Multi-spot Sensing,
Presenter: *Claudio G Jakobson (SCD)*

R5.3, Guided Flash Lidar: A Laser Power Efficient Approach for Long-Range Lidar,
Presenter: *Filip Taneski (University of Edinburgh)*

R5.4, FAD-SPADs: a New Paradigm for Designing Single-Photon Detecting Arrays,
Presenter: *Mel White (Rice University)*

R5.5, Pixel Modeling and Parameter Extraction for Event-based Vision Sensors,
Presenter: *Andreas Suess (Omnivision)*

R5.6, Exploiting Alternating DVS Shot Noise Event Pair Statistics to Reduce Background Activity Rates,
Presenter: *Brian J McCreynolds (AFIT/CI, Institute of Neuroinformatics, UZH/ETH Zurich)*

Social Trips

Tuesday 23rd May 1pm

[Click here for Social Trips Information on the IIS23 Website \[exits the digital proceedings\]](#)

Wednesday 24th May

Session 6: Beyond Visible & Scientific Imaging

Wednesday 24th May 8:45am

Session Chair: Daniel McGrath (Consultant)

R6.1, Stability and photometric accuracy of CMOS Imaging Detectors: radiation damage, surface charge, and quantum confinement in delta-doped surfaces,

Presenter: *Michael E Hoenk (Jet Propulsion Laboratory)*

R6.2, 5 Minutes Integration Time Deep UV Pixel Development for "Ultrasat" Space Mission,

Presenter: *Adi Birman (Tower Semiconductor)*

R6.3, Fabrication Of Small Pitch InGaAs Photodiodes Using In-Situ Doping And Shallow Mesa Architecture For SWIR Sensing,

Presenter: *Jules Tillement (STMicroelectronics)*

R6.4, Evaluating the theoretical optical performances of colloidal quantum dot films for infrared imaging,

Presenter: *Arthur Arnaud (STMicroelectronics)*

R6.5, Custom CMOS Image Sensors for Application to Low Light Level Imaging and Use in Extreme Low Light Level Electron Bombarded CMOS Image Sensors,

Presenter: *Verle Aebi (EOTech, LLC.)*

R6.6, A Thin-Film Pinned-Photodiode Imager Pixel with Fully Monolithic Fabrication - (workshop manuscript not submitted),

Presenter: *Joo Hyoung Kim (IMEC)*

Invited Presentations

Wednesday 24th May 11am

Invited Presentation 1,

Bending Out of the Box: The Marriage of Sensors and Computational Imaging,

Presenter: *Charles A. Bouman (Purdue University)*

Invited Presentation 2, Image Sensors in 3D stacking technology: Retrospective and Perspectives from a Digital Architect Point of View,

Presenter: *Jérôme Chossat (STMicroelectronics)*

Session 7: Speciality and New Applications

Wednesday 24th May 1:45pm

Session Chair: Amos Fenigstein (TowerJazz Semiconductor)

R7.1, In Depth Characterization and Radiation Testing of a High Performance Fully Passivated Charge Domain CDTI based CCD-on-CMOS Image Sensor,

Presenter: *Antoine Salih Alj (ISAE-SUPAERO / CNES / Thales Alenia Space)*

R7.2, A 200 Stages Bi-directional 2-Phases CCD-on-CMOS Back Side Illuminated Time Delay Integration Image Sensor,

Presenter: *Julien Michelot (Pyxalis)*

R7.3, A 316MP, 120FPS, High Dynamic Range CMOS Image Sensor for Next Generation Immersive Displays,

Presenter: *Abhinav Agarwal (Forza Silicon (Ametek Inc.))*

R7.4, Hybrid Visible Imaging and Near-infrared Optical Spectroscopy with Smartphone Image Sensor using Bioinspired Nanostructures - (workshop manuscript not submitted),

Presenter: *Tze Ching Fung (Samsung Semiconductor, Inc.)*

R7.5, 0.5e- rms Read Noise CMOS Image Sensors and Sub-Electron Image Processing for Night Vision Application,

Presenter: *Kwang Bo Cho (BAE Systems)*

R7.6, High-speed Time-Delay-Integration (TDI) Imaging with 2-D SPAD arrays,

Presenter: *Daniel Van Blerkom (SWIRLabs)*

Thursday 25th May

Session 8: SPAD Devices

Thursday 25th May 8:45am

Session Chair: Edoardo Charbon (EPFL)

R8.1, A 3.06 μm SPAD Pixel with Embedded Metal Contact and Power Grid on Deep Trench Pixel Isolation for High-resolution Photon-counting,

Presenter: *Jun Ogi (Sony Semiconductor Solutions Corporation)*

R8.2, A high PDE and high maximum count rate and low power consumption 3D-stacked SPAD device for Lidar applications,

Presenter: *Raul-Andres Bianchi (STMicroelectronics)*

R8.3, A NIR Enhanced SPAD Fabricated in 110 nm CIS Technology with 78% PDP at 500 nm,

Presenter: *Utku Karaca (EPFL)*

R8.4, GeSi SPAD for SWIR Sensing and Imaging,

Presenter: *Neil Na (Artlux)*

R8.5, Germanium on silicon SPAD 32x32 pixel array in 3D-stacked technology for SWIR applications,

Presenter: *Dominik Golanski (STMicroelectronics)*

R8.6, Doping Engineering for PDP Optimization in SPADs Implemented in 55-nm BCD Process,

Presenter: *Feng Liu (EPFL)*

Session 9: Time of Flight

Thursday 25th May 10:45am

Session Chair: Preethi Padmanabhan (Pointcloud inc.)

R9.1, A Half-Pulse 2-Tap Indirect Time-of-Flight Ranging Method with Sub-Frame Operation for Depth Precision Enhancement and Motion Artifact Suppression,

Presenter: *ChiaChi Kuo (Tohoku University)*

R9.2, A 3.5 μm Indirect Time-of-Flight Pixel with In-Pixel CDS and 4-Frame Voltage Domain Storage,

Presenter: *Erez Tadmor (onsemi)*

R9.3, A 320x232 LiDAR Sensor with 24dB Time-Amplified and Phase-Revolved TDC,

Presenter: *Chin Yin (TSMC)*

R9.4, A 648 x 484-Pixel 4-Tap Hybrid Time-of-Flight Image Sensor with 8 and 12 Phase Demodulation for Long-Range Indoor and Outdoor Operations,

Presenter: *Kamel Mars (Shizuoka University)*

R9.5, Tap mismatch mitigation of 3 μm 2-tap pixels of indirect Time-of-Flight image sensor for high-speed depth mapping,

Presenter: *Yuhi Yorikado (Sony Semiconductor Solutions)*

R9.6, A 1.2Mp indirect-ToF sensor with on-chip ISP for low-power and self-optimization,

Presenter: *Seung-Chul Shin (Samsung Electronics)*