



**2003 IEEE Workshop
on
Charge-Coupled Devices
and
Advanced Image Sensors**

**May 15-17, 2003
Schloss Elmau,
Elmau, Germany**

In cooperation with DALSA Corp.
and Philips Semiconductors.

Welcome !

It is a great pleasure to welcome all of you to the 2003 IEEE Workshop on Charge-Coupled Devices and Advanced Image Sensors at Schloss Elmau, Elmau, Germany. The purpose of the workshop is to discuss and exchange recent research results, provide in-depth discussion of common technical issues, and stimulate thinking about new research directions and activities.

I would like to thank dr. Edwin Roks, technical program committee chair and his committee for putting together an excellent, high quality technical program. This year we have about 50 papers for presentation. Unfortunately we did have to reject about 20 submissions because of the restricted number of time slots we do have available for presentations. On the other hand, the high number of submissions proves that the workshop is really "the place to be" for the technical experts in the imaging field.

All accepted papers will be orally presented. Some will be presented in longer time slots, some in shorter and those presented in poster format will be given 4 minutes for an oral presentation. In addition to the contributed papers, there will be our traditional lively discussion session (on a topic which will be decided really at the last minute), the selection of the best poster presentation and for the third time in a row, we will present the Walter Kosonocky Award. The latter is founded in honor to a great contributor to the imaging field. Walter Kosonocky was the inventor of the floating diffusion amplifier. Unfortunately Walter passed away in 1996. The Walter Kosonocky Award highlights the best paper published in solid-state imaging during the last two years, and the election of the winner is done by peers in the imaging community.

As in the past, this workshop is limited in attendance, based on the desire of the organizing committee to keep the workshop small and more personal, as well as the practical limitations of Schloss Elmau facilities. On behalf of the organizing committee, we apologize to the dozens of additional persons who desired to attend but were unable due to the rapid filling of the meeting.

I would like to thank my fellow organizing committee member, Eric Fossum and Nobukazu Teranishi, for their continued guidance in the planning and organization of this workshop. I would like to acknowledge also Chantal Castelijns, our workshop secretary, for her time and energy to make this workshop a success. Thanks also to Toos van Gool in assisting us with the compilation of the program of the workshop. Thanks to DALSA Corp. and Philips Semiconductors for their support of this year's efforts.

I wish you all a great and memorable workshop !

Albert J.P. Theuwissen
General Chair

2003 IEEE Workshop on Charge-Coupled Devices and Advanced Image Sensors

Conference Organizers

Albert Theuwissen	DALSA Corp.
Eric Fossum	Univ. of Southern California
Nobukazu Teranishi	Matsushita Electric Corp.

Conference Committee

Albert Theuwissen	General Chair, Walter Kosonocky Award Chair
Edwin Roks	Technical Program Chair
Chantal Castelijns	Conference Secretary
Toos van Gool	Technical Program Assistance

Technical Program Committee

Gary Allan	DALSA Corp.
Selim S. Bencuya	Pictos
Nicolas Blanc	CSEM
Barry E. Burke	MIT
Bart Dierickx	FillFactory
Eric R. Fossum	Univ. of Southern California
Yoshiaki Hagiwara	Sony
Bedrich Hosticka	Fraunhofer Institute
Gary W. Hughes	Rockwell
Jed Hurwitz	STMicroelectronics
Jerry Hyncek	Isetex
Takao Kuroda	Matsushita Electric Corp
Paul P.K. Lee	Kodak
Dan McGrath	Kodak
Junichi Nakamura	Micron
Edwin Roks	Philips Semiconductors
Nobukazu Teranishi	Matsushita Electric Corp.
Albert Theuwissen	DALSA Corp.
Shou-Gwo Wu	TSMC
Orly Yadid-Pecht	Bengurion University
Kazuya Yonemoto	Samsung

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Program

Thursday May 15th 2003

8:30	8:50	Opening remarks	Albert Theuwissen	
Session 1, chair : Bart Dierickx (FillFactory)				
8:50	9:20	A 2e Noise 1.3Megapixel CMOS Sensor	Alex Krymski, Nail Khaliullin, Howard Rhodes	Micron Imaging (USA)
9:20	9:40	Organic Photoconductive Films with Wavelength Selectivities	S. Aihara, Y. Hirano, T. Tajima, K. Tanioka, M. Abe, N. Saito, N. Kamata, D. Terunuma	NHK (Japan)
9:40	10:00	A Multi-Resolution 100 GOPS 4 Gpixels/s Programmable CMOS Image Sensor for Machine Vision	Robert Johansson, Leif Lindgren, Johan Melander, Bjoern Moeller	IVP (Norway)
10:00	10:30	Coffee break		
Session 2, chair : Nobukazu Teranishi (MEC)				
10:30	10:50	Dark current characterization of the CMOS APS imagers fabricated using a 0.18 um CMOS technology	Hyuck In Kwon, In Man Kang, Byung-Gook Park, Jong Duk Lee, Sang Sik Park	Seoul National University (Korea)
10:50	11:10	A CMOS Image Sensor with Gain-Adaptive Column Amplifiers	Masaki Sakakibara, Shoji Kawahito, Dwi Handoko, Nobuo Nakamura, Hiroki Satoh, Mizuho Higashi, Keiji Mabuchi, Hirofumi Sumi	Shizuoka University (Japan)
11:10	11:25	248-nm UV Damage Mechanism in MPP CCD's	Nixon O., Jonathan Huras, Sukhbir Kullar, Saladin Sahinovic	DALSA (Canada)
11:25	11:40	3-D Optical and Electrical Simulation for CMOS Image Sensors	Hideki Mutoh	Link Research (Japan)
11:40	12:00	Electroluminescence and Impact Ionization in CMOS Active Pixel Sensors	S. Maestre, P. Magnan	SUPAERO (France)
12:00	14:00	Lunch break		

Session 3, chair : Orly Yadid-Pecht (Ben-Gurion University)

14:00	14:30	Process and Pixels for High Performance Imager in SOI-CMOS Technology	Xinyu Zheng, Suresh Seshadri, Michael Wood, Chris Wrigley, Bedabrata Pain	JPL (USA)
14:30	14:50	Characterization of Dark Current in CMOS Image Sensors	Hein Otto Folkerts, Joris P.V. Maas, Daniel W.E. Verbugt, Adri J. Mierop, Willem Hoekstra, Natalia V. Loukianova, Edwin Rokhs	Philips Semiconductors (Netherlands)
14:50	15:10	Fabrication of Avalanche Multiplication type CMOS Imager using a-Si:H photodiode film	M. Akiyama, M. Hanada, H. Takao, K. Sawada, M. Ishida	Toyohashi University (Japan)
15:10	15:25	CMOS Image Sensor with Cumulative Cross Section Readout	Ryan Burns, Richard Hornsey	University of Waterloo (Canada)
15:25	15:40	Design Consideration of FPN suppression circuit for a 1.25" 8.3M-pixel digital output CMOS APS	M. Shirakawa, T. Yamashita, K. Mitani, M. Sugawara, I. Takayanagi, J. Nakamura, S. Iversen, J. Moholt, E.R. Fossum	NHK (Japan)

15:40 16:10 Coffee break

Session 4, chair : Edwin Rokhs (Philips Semiconductors)

16:10	16:20	Introduction poster session		
16:20	16:24	Programmable sensitivity image sensor with multi-capacitance CMOS pixels	Ryutaro. Oi, Kiyoharu. Aizawa.	University of Tokyo (Japan)
16:24	16:28	Analysis of potentialities of backside-illuminated thinned CMOS imagers	C. Marques-Vatus, P. Magnan	SUPAERO (France)
16:28	16:32	CCD Detection of 157 nm Photons	Flora Li, Nixon O, Arokia Nathan	University of Waterloo (Canada)
16:32	16:36	FAPS: A CMOS Sensors with multiple storage for fast imaging scientific applications	R. Turchetta,	Rutherford Appleton Lab. (UK)
16:36	16:40	Quarter pixel based random access image sensor for wide view imaging	Takayuki Hamamoto, Satoshi Shimizu, Ryusuke Kawahara	Tokyo University of Science (Japan)
16:40	16:44	Temperature dependence of dark current in a CCD	Ralf Widenhorn, Morley M. Blouke, Alexander Weber, Armin Rest, Erik Bodegom	Portland State University (USA)

16:44	16:48	CMOS APS Pixel Photoresponse Prediction for Scalable CMOS Technologies	Igor Shcherback, Alexander Belenky, Orly Yadid-Pecht	Ben-Gurion University (Israel)
16:48	16:52	Backside-hybrid photodetector and image sensor for trans-chip detection of NIR light	Takashi Tokuda, Yoshihisa Sakano, Keiichiro Kagawa, Jun Ohta, Masahiro Nunoshita	Nara Institute (Japan)
16:52	16:56	Image Sensor Architecture for Arbitrarily Directional Motion Detection Using Spatial Propagation Delay of Excitation Signal	Junichi Akita, Misako Takayasu, Hideki Takayasu, Amane Koizumi	Future University Hakodate (Japan)
16:56	17:00	Anomalous annealing behavior of the high resistivity CCD irradiated at cold temperature	G. Prigozhin, M. Bautz, S. Kissel, B. LaMarr, C. Grant	MIT (USA)
17:00	17:04	A High Speed Digital Vision Chip with Multi-grained Parallel Processing Capability	Takashi Komuro, Shingo Kagami, Masatoshi Ishikawa	University of Tokyo (Japan)
17:04	17:08	Charge Sensitive Elements Optimised for Particle Tracking	Grzegorz Deptuch	LEPSI (France)
17:08	17:12	Brain slice imaging. A 100x100 pixel CIS combining 40K frames per second and 14 bit dynamic range	Danny Scheffer, tom Walschap, F. Kubo, M. Ichikawa	FillFactory (Belgium)
17:12	17:16	Source followed noise limitations in CMOS active pixel sensors	K.M. Findlater, D.J. Baxter, R.K. Henderson, J.E.D. Hurwitz, L.A. Grant	STMicroelectronics (UK)
17:16	17:45	Coffee break		
		Session 5, chair :	Eric Fossum (Univ. Southern California)	
17:45	18:45	Discussion Session		
19:00	20:30	Dinner		
20:30	21:30	Poster Viewing		

Friday May 16th 2003

Session 6, chair : Gary Allan (DALSA)

8:30	9:00	Improvement of photo-sensitivity and smear characteristics in a 2.8 um-square pixel IT-CCD image sensor	Tohru Yamada, Hiroshi Tanaka, Ken Henmi, Masato Kobayashi, Horoyuki Mori, Yoshiaki Katoh, Yuji Miyata	Matsushita Electric Co. (Japan)
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9:00	9:20	CMOS Imager with Embedded Analog Early Image processor	Christophe Basset, Pietro Perona, Guang Yang, Bedabrata Pain	Caltech (USA)
9:20	9:40	An Ultra Low Noise High Speed CMOS Linescan Sensor for Scientific and Industrial Applications	Boyd Fowler, Janusz Balicki, Dana How, Steve Mims, John Canfield, Michael Godfrey	Pixel Devices (USA)
9:40	10:00	High Speed Photo Line Sensors	M. Lehmann, M Richter, L. Cavalier, F. Lustenberger, N. Blanc	CSEM (Switzerland)
10:00	10:30	Coffee Break		
Session 7, chair : Dan McGrath (Kodak)				
10:30	10:50	Charge Transfer Noise and Lag in CMOS Active Pixel Sensors	Eric R. Fossum	Univ. Southern California (USA)
10:50	11:10	A 1/2.7 optical format, 3M pixel and progressive scan PIACCD	Hiroo Umetsu, Katsumi Ikeda, Shinji Uya, Noriaki Suzuki, Tetsuo Yamada	FujiFilm Microdevices (Japan)
11:10	11:25	First images with a Medipix2-Silicon detector assembly	M. Campbell, E. Heijne, X. Llopart, L. Tlustos	CERN (Switzerland)
11:25	11:40	Measurement and Analysis of Pixel Geometric and Diffusion MTF Function Components in Photodiode APS Sensors	Tracy Dutton, Jaewon Kang, Terrence Lomheim, Richard Boucher, Ralph Shima, Mark Nelson	Aerospace Corp. (USA)
11:40	12:00	A 35 mm 13.89 Million Pixel CMOS Active Pixel Image Sensor	G. Meynants, B. Dierickx, A. Alaerts, D. Uwaerts, S. Cos	FillFactory (Belgium)
12:00	14:00	Lunch break		
Session 8, chair : Junichi Nakamura (Micron)				
14:00	14:15	Pyramidal Architecture fo CMOS Image Sensor	Faycal Saffih, Richard Hornsey	University of Waterloo (Canada)
14:15	14:30	Demonstration of a frequency-demodulation CMOS image sensor and its improvement of image quality	K. Yamamoto, Y. Oya, K. Kagawa, J. Ohta, M. Nunoshita, K. Watanabe	Nara Institute (Japan)
14:30	14:45	A Wide Dynamic Range CMOS Image Sensor with Integration of Short-Exposure-Time Signals	Masaaki Sasaki, Shoji Kawahito, Mitsuhiro Mase, Yoshiaki Tadokoro	Toyohashi University (Japan)
14:45	15:00	A retinal prosthetic device using a CMOS image sensor employed with modified pulse frequency modulation	J. Ohta, T. Furumiya, David C. Ng, A. Uehara, K. Kagawa, T. Tokuda, M. Nunoshita	Nara Institute (Japan)

15:00	15:15	Empirical Characterization of Lateral Crosstalk for CMOS Image Sensors and Restorative Deblurring Operations	J.S. Lee, J. Shah, R.I. Hornsey	University of Waterloo (Canada)
15:15	15:30	Curved Focal Plane Arrays	April Jewell, Shouleh Nikzad, Toddd Jones, David L. Broen, Thomas J. Cunningham	JPL (USA)
15:30	16:00	Coffee Break		
16:00	19:00	Social activity		
19:00	21:00	Banquet + WKA	WKA Chair : Albert Theuwissen (DALSA)	

Saturday May 17th 2003

Session 9, chair : Jed Hurwitz (STMicroelectronics)

8:30	9:00	An 8.2-Megapixel, 10-bit, 60-fps, CMOS APS	Steinar Iversen	Micron Technology (Norway)
9:00	9:20	A High S/N Ratio CMOS Image Sensor with Real Time Object Categorizing Function	Shigetoshi Sugawa, Tomoyasu Tate, Koji Chiba, Koji Kotani, Tadahiro Ohmi	Tohoku University (Japan)
9:20	9:40	Low Power Two-Chip Image Sensor Solution for High-End Scientific Applications	Markus Loose, Mark Farris, James Garnett, Donald Hall, Lester Kozlowski	Rockwell Scientific (USA)
9:40	10:00	First break		

Session 10, chair : Jerry Hyneczek (ISETEX)

10:00	10:15	A Software-controlled Pixel-level A-D Conversion Method for Digital Vision Chips	Shingo Kagami, Takashi Komuro, Masatoshi Ishikawa	University of Tokyo (Japan)
10:15	10:30	Dynamic Range Enlargement in CMOS Imagers with Buried Photodiode	Vladimir Berezin, Iliia Ovsianikov, Dmitri Jerdev, Richard Tsai	Micron Technology (USA)
10:30	10:45	Design Considerations For large Area Professional DSC CCD Imager Output Amplifiers	C. Draijer, W. Klaassens, H.I. Peek, B.G.M. Dillen, J.T. Bosiers	DALSA (Netherlands)
10:45	11:00	An Image-sensor-based optical receiver fabricated in a standard 0.35 um CMOS technology for mobile applications	Keiichiro Kagawa, Tomoaki Kawakami, Hiroaki Asazu, Tomohiro Nishimura, Jun Ohta, Nunoshita Masahiro, Kunihiro Watanabe	Nara Institute (Japan)
11:00	11:20	Second break		

Session 11, chair : Yoshi Hagiwara (Sony)

11:20	12:00	A Two-Dimensional Array Imager Demonstrating Feedback Reset Suppression of kTC Noise	Thomas J. Cunningham, Bruce Hancock, Guang Yang, Monico Ortiz, Chris Wrigley, Suresh Seshadri, Bedabrata Pain	JPL (USA)
12:00	12:20	A low power single chip VGA camera	Laurens Korthout, Parikshit Kumar, Kees van der Sanden, Jan van Geloven, Adrie Mierop, Christophe Kefeder, Olivier Poulmais, Noud Boudewijns, Ton van Keeken	Philips Semiconductors (Netherlands)
12:20	12:40	High Dynamic Range Imaging using Combined Linear-Logarithmic Responses from a CMOS Image Sensor	G.G Storm, J.E.D. Hurwitz, D. Renshaw, K.M. Findlater, R.K. Henderson, M.D. Purcell	University of Edinburgh (UK)
12:40	13:00	Concluding remarks	Albert Theuwissen	
13:00	14:00	Lunch		