

Brief Biography: Mr. Guidash received a BS in Electrical Engineering from the University of Delaware in 1981, and an MS in Electrical Engineering from Rochester Institute of Technology in 1991. Michael joined Kodak in 1981 as a Product Engineer for photometer ASIC's for Kodak film cameras. In 1986, he transferred to the Kodak Research Laboratories and CCD wafer fabrication facility. From 1986 – 1989, he developed 2um and 1um CMOS processes, and a 30V 4um BiCMOS process. These processes were used for gate arrays for many Kodak products, and output drivers Kodak copiers. From 1989 – 1996, Mr. Guidash managed the Smart Sensor Group which developed BiCMOS-CCD processes to provide fully integrated CCD systems on a chip. From 1993 – 1996, he also served as product and yield enhancement engineer for Kodak's high volume CCD's. In 1996 Michael helped form and led the CMOS Image Sensor (CIS) group. From 1996 to 2009, he managed the R&D and product development of CIS programs. Kodak closed the CIS business in August of 2009. From August of 2009 through April of 2012, Mr. Guidash worked as intellectual property technologist and coordinator. This included technical coordination of CIS patent applications and office actions, electronic components patent applications and office actions, and technical support for IP sales and licensing teams. Mr. Guidash left Kodak in May of 2012 to start a technology consulting company in the field of CIS. From 2012 to present, Mr. Guidash has continued development and innovation in CIS pixel and process technology, including pMOS pixels, Multi-bit binary pixels, low noise and high speed sensor readout design, high dynamic range image sensors, and BSI processes. He has authored or co-authored 30 papers/presentations in the fields of integrated circuits and image sensors. He has 115 issued patents and many active patent applications in the field of image sensors.

Career Highlights:

- **Chief Technologist and Innovator:** Initiated and led development efforts in CIS at Kodak in pixel and process design. Inventor of many key patents in the field of CMOS Image sensors including Pinned Photodiode Pixels, Camera-on-a-Chip architecture, and shared amplifier pixel architectures. Continued to innovate and invent to drive CIS cost reduction, features and performance. Applies strategic thinking to align business goals with short and long term technology and product plans. Known as a creative thinker and innovator, providing vision and leadership to bring ideas and concepts to the marketplace.
- **Technology Development Management:** Provided vision, roadmap and direction for a broad set of elements in circuit design, pixel architecture, process integration, and sensor/camera systems. Possesses technical and interpersonal skills to assemble, manage and motivate diverse cross-functional teams, that efficiently and successfully deliver to schedule.
- **Product Development:** Provided technical voice to market attack and business plans. Guided ideas and concepts from invention phase through R&D and through commercialization.
- **Technical Due Diligence:** Provided technical guidance and analysis for development partner selection, technology and resource acquisitions, and litigations.
- **Partner Management:** Negotiated, coordinated and directed 3rd party technology providers and external development partners, including foundries. Directed integration of CIS processes into 6 foundries.
- **Technical Skills:** CCD and CIS operation, design, device integration and fabrication technologies. Image sensor and ASIC yield enhancement; yield team management; rigorous and methodical problem solver, efficiently finding root causes and solutions for yield crises and problems.
- **Patents & Publications:** 115 issued patents; 33 publications

Professional Experience:

R.M. Guidash Consulting LLC: President, (May 2012 - Present)

Technical consulting services for CMOS Image Sensors (CIS):

- Process, pixels, circuits, sensor architectures, systems and IP. General and customized tutorials and advisement. Short and long term projects and problem solving.
- Development of CIS design and process technology, including pMOS pixels, multi-bit binary pixels, low noise and high speed sensor readout design, high dynamic range pixels, dark current and bright point reduction, and BSI device structures.

Eastman Kodak: Scientist and IP Specialist; Office of the CTO, (2010 - April 2012)

Post closure of Kodak CIS Business - Patent generation; patent application management; technical support for patent attorneys; technical support for IP sales and licensing teams.

- Continued patent generation for digital capture; technical support for pending patent applications; technical support for IP sales & licensing teams; Key member of team that sold CIS patents.

Eastman Kodak: Chief Technologist & Manager – CIS R&D; Image Sensor Division, (2001 - 2009)

Managed group of ~25 people in R&D of CIS technology elements, including pixel and process development, chip level architectures, analog readout architectures, and camera/module systems.

- Developed/demonstrated new technologies including Kodak panchromatic CFA patterns and processing, pMOS hole detector pixel, 3D hybrid stacked devices, and low read noise analog circuits. Designed and demonstrated 3D hybrid stacked BSI 1.4um pixel sensor in 2007-2008.
- Led team to file over 100 patent applications. Filed patent applications on and led development of 1st 3D hybrid stacked BSI CIS architecture. This led to demonstration of very high performance, low dark current BSI prototype sensors with pixel sizes ranging from 0.9um to 5.0um.
- Initiated and led a cross-functional camera R&D team directed at CIS and other Kodak technologies for novel co-optimized cameras and camera sub-systems.
- Provided technical guidance and analysis for selection and initiation of foundry and R&D partners.
- Managed directed technical interface with external partners in design, process and pixel development (IBM, TSMC, Ziptronix and others).

Eastman Kodak: Chief Technologist & Mgr. - CIS R&D/Prod. Dev; Image Sensor Division, ('95 - '01)

Managed and directed group of 10-15 people in all elements of CIS R&D and product development.

- Pioneered and championed CIS initiatives at Kodak.
- Inventor and co-inventor of many key patents in the field of CMOS Image sensors including Pinned Photodiode Pixels, Camera-on-a-Chip architecture, and shared amplifier pixel architectures.
- Led the development teams to key achievements; World's 1st commercialized pinned photodiode CIS, Megapixel CIS device, and Shared amplifier CIS pixel product.
- Led transfer of world's first commercial 1/2" optical format 1.3 megapixel CMOS image sensor into mass production, providing successful delivery to several compact digital camera products.
- Managed and directed technical interface with external partners in design, process and pixel development, (JPL, Photobit, Motorola, Intel, Tower Semiconductor).
- Initiated and directed a cross-functional team including resources from Motorola and other Kodak organizations to develop a small, low cost image module for cell phone applications. This effort won the 1997 Team Achievement Award at Kodak through development of a CIS cell phone module.

Eastman Kodak: Development Engineer – Smart Sensors; Image Sensor Division, (1989 – 1995)

- Led product delivery and technology development of all ASIC and smart sensor products. Performed all device modeling, device and process integration.
- Developed and demonstrated Interline CCD integrated with 2um CMOS on the same chip
- Led team to design and demonstrate first reported pinned PD Active Pixel CMOS Sensor, and linear CCD image sensor with on-chip timing and control.
- Led/coordinated world's 1st commercial megapixel CCD yield enhancement team at commercialization ramp up of DC40 digital camera. Brought yield from 0% to 60% in ~3 months assisting on-time launch of DC40 camera.
- Led/coordinated CCD yield enhancement team at commercialization ramp up of world's 1st USB peripheral, Kodak TCAM1. Brought yield from 0% to 50% in ~3 months.
- Led & directed CCD dark current and point defect reduction team.

Eastman Kodak: Product Engineer; Integrated Circuits Fabrication, Elmgrove Plant, (1984 – 1988)

Product Engineer for all Kodak Copier Output Driver IC's, DISC camera IC's, and Instant Camera IC's. Delivering ~6M devices per year. Responsible for all aspects of IC test, delivery, yield and cost.

- Developed software for device and statistical yield modeling
- Led and delivered on development of Smart Integrated Chemically Sensitive Field Effect Transistors for Kodak Harrow.
- Awarded Special Opportunity Graduate Program for MSEE degree. (RIT)

Eastman Kodak: Product Engineer; Integrated Circuits Fabrication, Elmgrove Plant, (1981 -1983)

- Product Engineer for all Kodak Instant Camera photometer IC's: brought yield of 5 new devices from 0% to 45% in ~4 months. Reached final yields of ~85%. Responsible for all aspects of IC test, packaging, delivery, customer interface and failure analysis, yield and cost.

Education:

M.S. (Electrical Engineering), Rochester Institute of Technology, 1991

B.S. (Electrical Engineering), University of Delaware, 1981

Publications and Presentations:

- 1 L.J. D'Luna, K.A. Parulski, T.J. Kenney, R.H. Hibbard, R.M. Guidash, P.R. Shelley, W.A. Cook, G.W. Brown, T.J. Tredwell; "A digital video signal processor for color image sensors" IEEE International Solid-State Circuits Conference, 1989 ISSCC. Digest of Technical Papers
- 2 W.A. Cook, K.A. Parulski, L.J. D'Luna, G.W. Brown, R.M. Guidash; "A digital signal processor for linear sensors"; IEEE Proceedings of the Custom Integrated Circuits Conference 1990 | Conference Paper
- 3 L. D'Luna, W. Cook, M. Guidash, G. Brown, T. Tredwell, J. Fischer, T. Tarn; "An 8x8 discrete cosine transform chip with pixel rate clocks"; IEEE ASIC Seminar; Sept. 1990
- 4 J.A. Vincent, W.A. Cook, L.J. D'Luna, G.W. Brown, R.M. Guidash; "A customizable timing controller for electronic imaging applications"; Proceedings of the IEEE 1991 Custom Integrated Circuits Conference
- 5 G. Ting, R.M. Guidash, P. Lee, C. Anagnostopoulos; "A Low Cost Smart-Power BiCMOS Driver Chip for Medium Power Applications"; IEEE ASIC Conference Proceedings; p. 466-469 [1994]
- 6 L. D'Luna, K. Parulski, D. Maslyn, M. Hadley, T. Kenney, R. Hibbard, M. Guidash, P. Lee, C. Anagnostopoulos; "A digital video signal post-processor for color image sensors"; IEEE ASIC Conference [1994]
- 7 P. Lee, R. Gee, M. Guidash, T. Lee, E. Fossum; "An active pixel sensor fabricated using CMOS/CCD process technology; 1995 IEEE Workshop on CCD's and Advanced Image Sensors.
- 8 M. Guidash, P. Lee, J. Andrus, A. Ciccarelli, H. Erhardt, J. Fischer, E. Meizenzahl; "A modular, high performance, 2um CCD-BiCMOS process technology for application-specific image sensors and image sensor systems on a chip; Proc. SPIE Vol. 2415, p. 256-264, April 1995
- 9 M. Guidash, P. Lee, J. Andrus, A. Ciccarelli, H. Erhardt, J. Fischer, E. Meizenzahl; "A modular, high performance, 2um CCD-BiCMOS process technology for application-specific image sensors and image sensor systems on a chip; CCD & Advanced Image Sensor Workshop, 1995
- 10 M. Guidash, T. Lee, P. Lee, et. al., "A 0.6um CMOS pinned photodiode color imager technology"; IEDM Tech. Digest 1997 p. 927-929

Publications and Presentations (continued):

11 M. Guidash, K. Parulski, “Digital Capture – not all pixels are created equal”, Industrial and Applied Physics Symposium, Rochester NY, October 2001

12 M. Guidash, et. Al., “A High-Performance, 6 μm 1.3 Megapixel, Pinned Photodiode CMOS Image Sensor”; SPIE Opto Northeast Conference; September 2001

13 M. Guidash, M. Mattern; “High-performance CMOS image sensor design, a combination of disciplines”, New York Microelectronics Design Conference, Rochester NY, Sept 2003

14 J. Zhang, S. Cooper, A. LaPietra, M. Mattern, M. Guidash, E. Friedman; “A low power thyristor-based CMOS programmable delay element. ISCAS (1) 2004; p. 769-772

15 D. McGrath, H. Fujita, M. Guidash, T. Kenney & W. Xu; “Shared pixels for CMOS imaging arrays”, CCD & Advanced Image Sensor Workshop, Kurizawa, Japan, 2005

16 F. Chu, M. Guidash, J. Compton, S. Coppola, W. Hintz; “Improving low-light CMOS performance with 4-transistor 4-shared architecture and charge domain binning; SPIE proceedings Vol 6069; pp. 25-33; 2006

17 R. Michael Guidash, John T. Compton, R. Daniel McGrath, Edward T. Nelson, Christopher Parks, Joseph R. Summa, “A 1.4 μm pixel front-side-illuminated image sensor for mobile phones”, IEEE International Image Sensor Workshop, Trondheim Norway, June 2009

18 Thomas Vogelsang, Michael Guidash, Song Xue, “Overcoming the Full Well Capacity Limit: High Dynamic Range Imaging Using Multi-Bit Temporal Oversampling and Conditional Reset”, IEEE International Image Sensor Workshop, Park City Utah, June 2013

19 Thomas Vogelsang, David G. Stork and Michael Guidash, “A Hardware Validated Unified Model of Multi-Bit Temporally and Spatially Oversampled Image Sensors with Conditional Reset”, SPIE Journal of Electronic Imaging 23(1), 013021 (Jan-Feb 2014).

20 Michael Guidash and Thomas Vogelsang, “Non-Destructive Threshold Assessment of a Pinned Photodiode Pixel with Correlated Double Sampling”, 18TH IEEE International Symposium on Consumer Electronics, June 22-25, 2014.

21 Thomas Vogelsang, Michael Guidash, Jay Endsley and Craig Smith, “A 2MP Oversampling Image Sensor with 2.75 μs Row Time and Conditional Threshold Comparison”, IEEE International Image Sensor Workshop, Vaals Netherlands, June 2015

22 Michael Guidash, JiaJu Ma, Thomas Vogelsang and Jay Endsley, “Reduction of CMOS Image Sensor Read Noise to Enable Photon Counting”, Sensors Magazine Special Issue on Photon Counting, April 2016

23 Salman Kabir, Craig Smith, Gerrit Barnard, Alex Schneider, Frank Armstrong, Michael Guidash, Thomas Vogelsang, and Jay Endsley; “Optimization of CMOS image sensor utilizing variable temporal multi-sampling partial transfer technique to achieve full-frame high dynamic range with superior low light and stop motion capability”; 2017 IS&T International Symposium on Electronic Imaging, Jan-Feb 2017

24 W. Gao, M. Guidash, et. al, Photodiode Barrier Induced Lag Characterization Using a New Lag vs. Idle Time Methodology”, IEEE International Image Sensor Workshop, Hiroshima Japan, June 2017

25 Salman Kabir, Michael Guidash, et. al., “A Small Pixel High Performance Full Frame HDR Sensor”, IEEE International Image Sensor Workshop, Hiroshima Japan, June 2017

Publications and Presentations (continued):

26 Salman Kabir, Michael Guidash, et. al., “Optimization of CMOS image sensor utilizing variable temporal multisampling partial transfer technique to achieve full-frame high dynamic range with superior low light and stop motion capability”, SPIE Journal of Electronic Imaging 27(2) 023030, April 24, 2018

27 Minseok Oh, Michael Guidash, et. al., “3.0um Backside Illuminated, lateral overflow, high dynamic range, LED flicker mitigation image sensor”, IEEE International Image Sensor Workshop, Snowbird Utah, June 2019.

28 Michael Guidash, et. al., “Floating Diffusion Dark Current and Dark Signal Non-Uniformity Reduction for High Dynamic Range Overflow Collection Pixels in High Temperature Applications”, IEEE International Image Sensor Workshop, Snowbird Utah, June 2019.

29 Sergey Velichko, Michael Guidash, et. al., “Intrinsic Si Quantum Efficiency, Responsivity and Other Parameters Temperature Dependence for BSI Image Sensors”, IEEE International Image Sensor Workshop, Snowbird Utah, June 2019.

30 Minseok Oh, Michael Guidash, et. al., “Automotive 3.0um Pixel High Dynamic Range Sensor with LED Flicker Mitigation”, MDPI Sensors Magazine Special Issue on IISW 2019, March 2020

31 Sergey Velichko, Michael Guidash, et. al., “Automotive 3.µm HDR Image Sensor with LED Flicker Mitigation and Distance Functionality”, IEEE International Image Sensor Workshop, September 2021.

32 Shou-Gwo Wu, R. Michael Guidash, et. al., “A Review of 3-Dimensional Wafer Level Stacked Backside Illuminated CMOS Image Sensor Process Technologies”, IEEE Transactions on Electron Devices 2022 Special Issue on Solid State Image Sensors, June 2022.

33 Sergey Velichko, Michael Guidash, et. al., “Automotive 3.µm HDR Image Sensor with LED Flicker Mitigation and Distance Functionality”, IEEE Transactions on Electron Devices 2022 Special Issue on Solid State Image Sensors, June 2022.

US Patents: (115 issued)

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|------------|------------|------------|------------|------------|------------|------------|------------|
| 11,323,644 | 11,284,034 | 11,276,721 | 11,165,977 | 11,114,482 | 11,012,629 | 10,798,322 | 10,659,715 |
| 10,652,493 | 10,594,973 | 10,567,683 | 10,535,690 | 10,362,256 | 10,356,350 | 10,306,169 | 10,277,843 |
| 10,257,448 | 10,249,660 | 10,165,209 | 10,154,220 | 10,136,090 | 10,104,318 | 10,103,190 | 10,070,084 |
| 10,002,895 | 9,894,304 | 9,883,130 | 9,681,071 | 9,667,898 | 9,521,349 | 9,521,351 | 9,491,391 |
| 9,462,181 | 9,432,597 | 9,380,245 | 9,264,639 | 9,241,118 | 9,070,611 | 9,001,251 | 8,957,981 |
| 8,946,612 | 8,836,784 | 8,829,637 | 8,736,728 | 8,730,362 | 8,665,340 | 8,587,681 | 8,558,292 |
| 8,378,398 | 8,339,494 | 8,253,214 | 8,194,178 | 8,178,938 | 8,164,682 | 8,158,453 | 8,101,450 |
| 8,076,749 | 8,049,256 | 8,018,016 | 7,973,876 | 7,969,469 | 7,859,581 | 7,858,915 | 7,830,435 |
| 7,705,900 | 7,675,097 | 7,674,648 | 7,443,431 | 7,361,877 | 7,342,213 | 7,238,926 | 7,092,017 |
| 6,730,899 | 6,730,897 | 6,721,008 | 6,714,239 | 6,710,804 | 6,680,498 | 6,657,665 | 6,624,850 |
| 6,587,146 | 6,552,323 | 6,504,195 | 6,486,504 | 6,466,266 | 6,423,994 | 6,365,926 | 6,352,869 |
| 6,323,476 | 6,307,195 | 6,297,070 | 6,259,124 | 6,218,692 | 6,218,656 | 6,184,928 | 6,160,281 |
| 6,127,697 | 6,107,655 | 6,100,556 | 6,100,551 | 6,069,377 | 6,051,447 | 6,027,955 | 5,986,257 |
| 5,949,061 | 5,904,493 | 5,903,021 | 5,841,159 | 5,625,210 | 5,621,230 | 5,591,997 | 5,387,536 |
| 5,338,946 | 5,881,184 | 5,872,371 | | | | | |

Organizations:

- Member IEEE
- International Image Sensor Workshop; Member Technical Program Committee 2017, 2019, 2021, 2023
- Board of Directors – International Image Sensor Society 2018 – Present
- Guest Editor in Chief: 2022 Solid State Image Sensors Special Issue, IEEE Trans. on Electron Devices

Awards:

- Eastman Kodak Company – Distinguished Inventor
- Rambus – Qualified as a Gold Distinguished Inventor
- CMOS Image Sensor work at Kodak awarded a 2021 Technical Emmy
- 2022 Kepner-Tregoe Problem Solving Excellence Award

Expert Consultant Cases:

(italic text indicates client; listed as Plaintiff vs. Defendant(s) or Petitioner vs. Patent Owner)

1. Cal-Tech vs. *ST Microelectronics*; Infringement Analysis; October 2012
2. Imperium Holdings vs. *Motorola Mobility, Kyocera, Sony Mobile*; Infringement analysis; Civil Action No. 4:11-cv-00163-RC-ALM; February 2013
3. Cal-Tech vs. *Omnivision Technologies*; Validity Analysis; December 2013
4. HSM LLC vs. *ST Microelectronics et. al.*; Infringement and Validity Analysis; April-October 2014
5. Fujian Newland Computer Co. Ltd. vs. *Hand Held Products Inc.*; Validity Analysis; Case IPR2013-00595; August 2014
6. Fujian Newland Computer Co. Ltd. vs. *Honeywell Inc.*; Validity analysis; Chinese Invalidity; May 2017
7. *Kyocera* vs. e-Watch;; Validity Analysis; 2 IPR Petitions; December 2014
8. *Aptina, ON Semi* vs. Collabo Innovations; Infringement and Validity Analysis; Case No. 1:14-cv-01093-SLR; April-October 2015
9. *Sony Corp.* vs. Collabo Innovations Inc.; Validity Analysis; IPR2016-00939, IPR2016-00940, IPR2016-0094, IPR2017-00958, IPR2017-00960; January 2016-May 2017
10. Hamamatsu vs. *SiOnyx*; Validity Analysis; IPR2016-01910; 2017;
11. *SiOnyx* vs. Hamamatsu; Infringement Analysis; Civil Action No. 15-cv-13488-FDS; 2018
12. *Lenovo* vs. Photonic Imaging Solutions; IPR2019-01075
13. *Honeywell Inc.* vs. Opticon Inc., ITC Inv. No. 337-TA-1165; Infringement Analysis; July 2019
14. *SmartSens Technology Inc.* vs. Omnivision Technologies Inc.; IPR2019-01263; Validity Analysis; April 2019
15. *Honeywell Inc.* vs. Zebra Technologies Corp. , ITC Inv. No. 337-TA-1285; Infringement Analysis; April 2021
16. *Hand Held Products, Inc. and Metrologic Instruments, Inc.* -v- Zebra Technologies Europe Limited and Zebra Technologies Corp., Claim No. HP2021000036;
17. Symbol Technologies LLC and Zebra Technologies Europe Limited -v- *Honeywell International Inc. and (2) Honeywell Control Systems Limited*, Claim No. HP-2022-000001

Expert Consultant Depositions or Trial Testimony:

1. Imperium Holdings vs. *Motorola Mobility, Kyocera, Sony Mobile*; Deposition testimony, Civil Action No. 4:11-cv-00163-RC-ALM; February 2013
2. Fujian Newland Computer Co. Ltd. vs. *Hand Held Products Inc.* ; Deposition testimony; Case IPR2013-00595; August 2014, May 2015
3. *Sony* vs. Collabo Innovations Inc.; Deposition testimony; (Total of 5 depositions 1/2017 – 10/2017)
4. Hamamatsu vs. *SiOnyx*; Deposition testimony; IPR2016-01910; July 2017
5. *SiOnyx* vs. Hamamatsu; Deposition testimony; 1:15-cv-13488; April 2018
6. Fujian Newland Computer Co. Ltd. vs. *Hand Held Products Inc.* ; Trial testimony; Chinese Invalidity case; May 2017
7. Fujian Newland Computer Co. Ltd. vs. *Hand Held Products Inc.* ; Trial testimony; Chinese Invalidity case; August 2018
8. *Honeywell Inc.* vs. Opticon Inc., ITC Inv. No. 337-TA-1165; Deposition testimony; December 2019
9. *SmartSens Technology Inc.* vs. Omnivision Technologies Inc.; IPR2019-01263; Deposition testimony; February 2020, June 2020, September 2020
10. *Honeywell Inc.* vs. Zebra Technologies Corporation, ITC Inv. No. 337-TA-1285; Infringement Deposition testimony; May 2022