Session 1: Annual SID Business Meeting
Tuesday, June 9, 2020 / 8:00 AM – 8:20 AM / Room 205/216

Session 2: Opening Remarks / Keynote Addresses
Tuesday, June 9, 2020 / 8:20 AM – 10:20 AM / Room 205/216
Chair: Yi-Pai Huang, Apple, Inc., Cupertino, CA US
2.1: Keynote Address 1: Display Technology Requirements for Next Generation PCs, James Johnson, Corporate Vice President, Intel
2.2: Keynote Address 2: The Future of Display Technologies, SooYoung Yoon, SVP, LG Display
2.3: Keynote Address 3: Quantum Computing System, Robert Wisnieff, CTO, Quantum Computing/Distinguished Research Staff Member, IBM TJ Watson Research Center

Session 3: 8K, High Resolution LCDs (Liquid Crystal Technology)
Tuesday, June 9, 2020 / 11:10 AM - 12:40 PM / Room 201/202
Chair: Miyoshi Ayama, Utsunomiya University
Co-Chair: Philip Chen, National Chiao Tung University
3.1: Invited Paper: Super Bright 8K LCD with 10,000 nit has been Realized with Excellent Light-Resistance Characteristics of IGZO TFT Backplane
Jun Nishimura, Sharp Corp. Display Device Company, Kameyama, Japan
3.2: Invited Paper: A Wide Color Gamut LCD with a Polarized Laser Backlight
Kan-Cheng Tien, AU Optronics, Hsinchu, Taiwan Roc
3.3: Novel Microstructure Film to Improve Viewing Angle of Multi-Domain Polymer Sustained Alignment LCD
Shinichi Komura, Japan Display Inc., Mobara, Japan
3.4: Novel LCD Pixel Design with Extra Large Aperture Ratio for PsVA Mode Display
Kun-Cheng Tien, AU Optronics, Hsinchu, Taiwan Roc
3.5: Late-News Paper: Two-Dimensionally Aligned Array with 1µm Pixel Pitch Using Ferroelectric Liquid Crystal Pixels for Holography Application
Shintaro Aso, Japan Broadcasting Corporation, Tokyo, Japan

Session 4: Automotive Display Components (Automotive/Vehicular Displays and HMI Technologies)
Tuesday, June 9, 2020 / 11:10 AM - 12:30 PM / Room 203
Chair: David Hermann, Volvo Car Corporation AB
Co-Chair: Karlheinz Blankenbach, Pforzheim University
4.1: Invited Paper: Technical Cover Glass Designed for Automotive Infotainment Display
Casey Kang, Corning Incorporated, Corning, NY US
4.2: Anti-Glare Cover Glass Optical Properties Dependence on the Display Module Configuration
Masanobu Ishii, AGC Inc., Yokohama, Japan
4.3: Late-News Paper: OLED Device Technologies for Automotive Application
Shigeru Mori, Tianma Japan, Ltd., Kawasaki, Japan
4.4: Increase of Contrast in 3D HUD Using an Active Parallax Barrier
Akinori Sato, KYOCERA Corporation, Shiga, Japan

Session 5: AR/VR Invited Session (Augmented, Virtual and Mixed Reality / Display Systems)
Tuesday, June 9, 2020 / 11:10 AM - 12:30 PM / Room 205/213
Chair: Achin Bhowmik, Starkey Hearing Technologies
Co-Chair: Seung Woo Lee, Kyung Hee University
5.1: Invited Paper: Human Factors in Virtual and Augmented Reality
Martin Banks, University of California Berkeley, Berkeley, CA US
5.2: Invited Paper: Computational Eyeglasses and Near-eye Displays with Focus Cues
Gordon Wetzstein, Stanford University, Stanford, CA US
5.3: Invited Paper: Optics and Architecture of Hololens 2 Mixed-Reality Headset
Bernard Kress, Microsoft, Redwood City, CA US
5.4: Invited Paper: Current Challenges in Augmented-Reality Waveguide Display Technology
Jonathan Waldern, DigiLens Inc., Sunnyvale, CA US
Session 6: OLED Materials I (OLEDs)
Tuesday, June 9, 2020 / 11:10 AM - 12:30 PM / Room 216/208
Chair: Denis Kondakov, DuPont
Co-Chair: Sven Zimmermann, Novaled GmbH
6.1: Invited Paper: Lifetime Improvement of TADF-OLEDs
Jun-Yun Kim, LG Display, Seoul, South Korea
6.2: Invited Paper: Innovative Technological Progress of Lifetime in Hyperfluorescence
Junji Adachi, Kyulux Inc., Fukuoka, Japan
6.3: Efficient and Long Lifetime Blue TADF and Deep Blue Hyper Fluorescent Materials and Devices
Jang-Hyuk Kwon, Kyung Hee University, Seoul, South Korea
6.4: Late-News Paper: Realizing Deep Blue Emission in Blue Phosphorescent Organic Light-Emitting Diodes
Jinwon Sun, Samsung Display, Co., Ltd., Yongin, South Korea

Session 7: Reliability (Active Matrix Devices)
Tuesday, June 9, 2020 / 11:10 AM - 12:30 PM / Room 211
Chair: Hsing-Hung Hsieh, HP International Pte. Ltd.
Co-Chair: Xiaojun Guo, Shanghai Jiao Tong University
7.1: Alleviation of Abnormal NBTI Phenomenon in LTPS TFTs on Polyimide Substrate for Flexible AMOLED
Jaeseob Lee, Samsung Display Co., Ltd., Yongin, South Korea
7.2: Invited Paper: Hot Carrier Degradation in High Mobility Metal Oxide Thin Film Transistors
Yukiharu Uraoka, Nara Institute of Science and Technology, Ikoma, Japan
7.3: High ESD Robustness and Low Visible Light Reflectance Design for LTPS-TFTs on Glass Substrates in Modular Micro-LED Displays
Seongho Son, Samsung Electronics Co., Ltd., Suwon, South Korea
7.4: Late-News Paper: Development of High-Mobility Top-Gate IGZTO-TFT and Suppression of Threshold Voltage Shift in Short Channel Utilizing Laser Irradiation Process
Mitsuru Nakata, NHK Science & Technology Research Laboratories, Tokyo, Japan

Session 8: Advances in Lighting: OLEDs, Materials, and Manufacturing (Lighting)
Tuesday, June 9, 2020 / 11:10 AM - 12:30 PM / Room 209/210
Chair: Eric Margulies, Universal Display Corporation
Co-Chair: J. Norman Bardsley, Bardsley Consulting
8.1: Invited Paper: Development of High-Temperature Stable Red OLEDs for Automotive Lighting
Marina Kondakova, OLEDWorks LLC, Rochester, NY US
8.2: Invited Paper: High Refractive Index Material for Display and Lighting Applications
Selina Monickam, Pixelligent Technologies, LLC, Baltimore, MD US
8.3: Invited Paper: OLED Lighting Design and Roll-to-Roll Manufacturing
Christian May, Fraunhofer-Institute for Organic Electronics, Dresden, Germany
8.4: Invited Paper: Flexible Glass Substrate for OLED Lighting Application and Efficient Internal Light Extraction for OLED Lighting Devices
Dipak Chowdhury, Corning Technology Center Korea, Seoul, South Korea

Session 9: MicroLED Manufacturing (Display Manufacturing)
Tuesday, June 9, 2020 / 11:10 AM - 12:40 PM / Room 207/215
Chair: Ion Bita, Google LLC
Co-Chair: Bradley Bowden, Corning Research and Development Corporation
9.1: Invited Paper: Colloidal Lead Halide Perovskite Nanocrystals as Classical and Quantum Light Sources
Maksym Kovalenko, ETH Zurich and Empa, Zurich, Switzerland
9.2: Manufacturing Process for Mass-Production of Micro LED Displays
Koichi Kajiyama, V-Technology Co., Ltd, Yokohama, Japan
9.3: Advanced Process and Structure of Backplane for Micro LED Display
Hua-Fei Xie, Peking University, Shenzhen, China
9.4: Applying FPD Panel and Manufacturing Technologies to Alternative Applications and New Business Models
Charles Annis, IHS Markit, Tokyo, Japan
9.5: Late-News Paper: A 3.9-inch LTPS TFT Full Color MicroLED Display with Novel Driving and Reflector Cavity Process
Masaya Tamaki, Kyocera Corporation, Shiga, Japan

Session 10: HDR LCDs I (Liquid Crystal Technology / Display Systems / High-Dynamic-Range LCDs)
Tuesday, June 9, 2020 / 2:00 PM - 3:20 PM / Room 201/202
Chair: Brian Berkeley, Highlight Display LLC
Co-Chair: Shin-Tson Wu, University of Central Florida
10.1: Invited Paper: High Dynamic Range Mini-LED and Dual-Cell LCDs
Shin-Tson Wu, University of Central Florida, Orlando, FL US
10.2: Invited Paper: Development of Dual-Cell LCD with Mega Contrast
Session 11: Automotive Display Technologies and Systems (Automotive/Vehicular Displays and HMI Technologies)
Tuesday, June 9, 2020 / 2:00 PM - 3:20 PM / Room 203
Chair: Casey Kang, Corning Incorporated
Co-Chair: Rashmi Rao, Harman International
11.1: High Reliability Flexible AMOLED Display with Algorithm Compensation for Automotive Application
Youxiong Feng, BOE Technology Group Co., Ltd., Chengdu, China
11.2: Late-News Paper: Display/Projection Features: The Next Growth Driver for Automotive Lighting
Pars Makish, Yole Développement, Villeurbanne, France
11.3: Advanced Methods for Safe Visualization on Automotive Displays
Benjamin Axmann, Daimler AG Group Research, Boeblingen, Germany
11.4: Invited Paper: Virtual prototyping and testing of automotive capacitive touch sensors
George Bouzianas, Fieldscale PC, Thessaloniki, Greece

Session 12: OLED AR/VR (Augmented, Virtual and Mixed Reality / OLEDs)
Tuesday, June 9, 2020 / 2:00 PM - 3:20 PM / Room 205/213
Chair: Qi Wang, eMagin Corporation
Co-Chair: Franky So, North Carolina State University
12.1: Invited Paper: Directional SPP Emission in OLEDs Using Diffractive Optical Elements
Xiangyu Fu, North Carolina State University, Raleigh, NC US
12.2: High Performance OLED Microdisplays Made with Multi-Stack OLED Formulations
John Hamer, OLEDWorks LLC, Rochester, NY US
12.3: Organic Light-Emitting Diode Microdisplay with a 32:9 Aspect Ratio for Wide Field of View
Hunsook Lee, Electronics and Telecommunications Research Institute, Daejeon, South Korea
12.4: 1000PPI LTPS OLED Display for VR Application
Ziyang Yu, Chengdu BOE Optoelectronics Technology Co., Ltd., Chengdu, China

Session 13: OLED Materials II (OLEDs)
Tuesday, June 9, 2020 / 2:00 PM - 3:20 PM / Room 216/208
Chair: Hitoshi Kuma, Idemitsu Kosan Co., Ltd.
Co-Chair: Nicholas Thompson, Universal Display Corporation
Russell Holmes, University of Minnesota, Minneapolis, MN US
13.2: Late-News Paper: How to Reduce Harmful Blue Light on OLED Device
Junsook Kang, Samsung Display Corporation, Youngin, South Korea
13.3: Improvement of Blue Pixels in OLED Panels with More Efficient Fluorescent and TADF Emitters
Thomas Baumann, cynora GmbH, Bruchsal, Germany
13.4: Late-News Paper: Effect of Molecular Structure of Host Materials on Thermal Stability and Device Characteristics of Solution Processed OLEDs
Min Chul Suh, Kyung Hee University, Seoul, South Korea

Session 14: Image Sensors (Active Matrix Devices)
Tuesday, June 9, 2020 / 2:00 PM - 3:00 PM / Room 211
Chair: Sang Hee Park, KAIST
Co-Chair: Tse Nga Tina Ng, University of California San Diego
14.1: Flexible Large-Area Multi-Fingerprint Sensors Based on Thermal Mass Detection
Florjan De Roose, imec, Leuven, Belgium
Yusuke Niikura, Semiconductor Energy Laboratory Co., Ltd., Kanagawa, Japan
14.3: Flexible Image Sensor Array Using IGZO TFT Backplane Technology for X-Ray Detector
Rikiya Takita, Sharp Corporation, Taki, Japan
14.4: Late-News Paper: Large-Area Optical Fingerprint Sensors for Next Generation Smartphones
Noémie Ballot, Isorg, Limoges, France

Session 15: Advanced TFT Manufacturing (Display Manufacturing)
Tuesday, June 9, 2020 / 2:00 PM - 3:20 PM / Room 209/210
Chair: Dr. Chiwoo Kim, APS Holdings
Co-Chair: Greg Gibson, nTact

15.1: Invited Paper: Manufacturing Technology of LTPO TFT
Ui-Jin Chung, LG Display Co., Ltd., Paju, South Korea

15.2: Gen 10 Excimer Laser Annealing System
Takahiro Fuji, The Japan Steel Works, Ltd., Yokohama, Japan

15.3: Resistance Reduction of Molybdenum Metallization by Tungsten Seed Layer
Harald Köstenbauer, Plansee SE, Reutte, Austria

15.4: New Gen. 6 Exposure Tools for 1.2 µm Resolution
Nobuhiko Yabu, Canon Inc., Utsunomiya, Japan

Session 16: MicroLED Color Conversion (Emissive, Micro-LED, and Quantum-Dot Displays)
Tuesday, June 9, 2020 / 2:00 PM - 3:30 PM / Room 207/215
Chair: Seth Coe-Sullivan, Luminit, LLC
Co-Chair: Ioannis Kymissis, Columbia University

Yang Gu, X-Vision Lab, Visionox Technology Inc., Kunshan, China

16.2: A 4-inch Full Color Active-matrix Mini-LED Display Based on 0408 Chip and 500um Pixel
Hong Meng, Peking University, Shenzhen, China

16.3: High-End Displays Applications by Micro-LEDs
Chien-Chung Lin, Industrial Technology Research Institute, Hsinchu, Taiwan ROC

16.4: Late-News Paper: High Color Gamut Mini-LED Backlight Demon Based on Dual-Emissive Perovskite Quantum Dots Films
Haizheng Zhong, Beijing Institute of Technology, Beijing, China

16.5: Late-News Paper: High Flux Stable Perovskite Quantum Dots-Polymer Composite for Down-Converting Applications
Lutfan Sinatra, Quantum Solutions LLC, Thuwal, Saudi Arabia

Session 17: HDR LCDs II (Liquid Crystal Technology / Display Systems / High-Dynamic-Range LCDs)
Tuesday, June 9, 2020 / 3:40 PM - 5:40 PM / Room 201/202
Chair: Jenn Jia Su, AU Optronics Corporation
Co-Chair: Matthew Sousa, 3M

17.1: Invited Paper: An Overview of Solutions for Achieving HDR LCDs
Jenn Jia Su, AU Optronics Corporation, Hsinchu, Taiwan ROC

17.2: A Method for Improving Image Contrast Based on Dual Cell Display
Yichao Zhao, TCL China Star Optoelectronics Technology Co., Shenzhen, China

17.3: Novel Mini-LED Backlit for 75-inch HDR LCD
Enhui Guan, BOE Technology Group Co., Ltd., Beijing, China

17.4: Enhancing the Picture Quality of Local Dimming Mini-LED LCD
Chun-Chi Chen, TCL China Star Optoelectronics Technology Co., Ltd., Shenzhen, China

17.5: Birefringent Light-Shaping Films for Mini-LED Backlights
Ziqian He, University of Central Florida, Orlando, FL US

17.6: Invited Paper: 4K HDR "Stacked-Panel" TV Based on Dual-Cell LCD
Weidong Liu, Hisense Visual Technology Co., Ltd, Qingdao, Shandong, China

Session 18: Head-Up Displays (HUD) (Automotive/Vehicular Displays and HMI Technologies)
Tuesday, June 9, 2020 / 3:40 PM - 5:00 PM / Room 203
Chair: Philippe Coni, THALES Avionics
Co-Chair: Haruhiko Okamura, Toshiba Corporation

18.1: Invited Paper: Holographic Optical Elements for Automotive Windshield Displays
Ian Redmond, Ceres Holographics Ltd, St Andrews, FL United Kingdom

18.2: Improvement of Light Leakage in HUD System
Kenta Kamoshida, KYOCERA Corporation, Shiga, Japan

18.3: Impact Study of Windshield Geometry on the Subjective Customer Perception for Augmented Reality Head-Up Displays (AR-HUD)
Daniel Wagner, Mercedes-Benz AG, Sindelfingen, Germany

18.4: Invited Paper: Switchable Lightfield Displays for Automotive Applications
David Fattal, Leia Inc, Menlo Park, CA US

Session 19: Human Factors with AR/VR (Augmented, Virtual and Mixed Reality / Applied Vision)
Tuesday, June 9, 2020 / 3:40 PM - 5:00 PM / Room 205/213
Chair: Takashi Shibata, Tokyo University of Social Welfare
Co-Chair: Yi Pai Huang, Apple, Inc.

19.1: Differences Between Oculomotor and Perceptual Artifacts for Temporally Limited Head-Mounted Displays
T. Scott Marudison, Facebook, Redmond, WA US

19.2: Vergence-Accommodation Conflicts in Augmented Reality: Impacts on Perceived Image Quality
Ian Erkelens, Facebook, Redmond, WA US
Session 20: OLED Materials III (OLEDs)
Tuesday, June 9, 2020 / 3:40 PM - 5:00 PM / Room 216/208
Chair: Jang Hyuk Kwon, Kyung Hee University
Co-Chair: Changwoong Chu, Samsung Display Corporation
Ken-Tsung Wong, National Taiwan University, Taipei, Taiwan ROC
19.3: Foveated Brightness Control Technology for VR Applications
Seung-Woo Lee, Kyung Hee University, Seoul, South Korea
19.4: Research on Reducing Motion Sickness of Playing First Person Shooting VR Game with Texture Blur
Ting-Lan Tsai, National Taiwan University of Science and Technology, Taipei City, Taiwan ROC
20.2: High Efficiency and Long Device Lifetime Green Organic Light Emitting Fodes Using a Pt Complex
Sunghun Lee, Samsung Electronics, Suwon, South Korea
20.3: Universal Method to Inject Electrons Into Organic Semiconductors Utilizing Hydrogen Bonds
Hirohiko Fukagawa, NHK Science & Technology Research Laboratories, Tokyo, Japan
20.4: Study on the Effect of OLED Device Lifetime Improvement According to Hole Injection Barrier and p-Dopants
Jaechul Hong, Samsung Display Co., Ltd., Yongin, South Korea

Session 21: Super Resolution and Gen 11 (Active Matrix Devices)
Tuesday, June 9, 2020 / 3:40 PM - 4:40 PM / Room 211
Chair: Dr. Kalluri Sarma, Honeywell, Inc
Co-Chair: Hyun Jae Kim, Yonsei University
21.1: Invited Paper: 5291-ppi Microdisplay Using CAAC-IGZO FET with Channel Length of 60 nm
Hideaki Shishido, Semiconductor Energy Laboratory Co., Ltd., Atsugi, Japan
Chi-Sun Hwang, ETRI, Daejeon, South Korea
21.3: Invited Paper: High Quality 8K4K Displays Driven by Oxide Semiconductor Thin Film Transistor in the Generation 11 Equipment
Hyun-Sik Seo, TCL Shenzhen China Star Optoelectronics Technology Co., Ltd., Shenzhen, China

Session 22: Flexible Technologies I: Manufacturing (Display Manufacturing / Flexible Displays and E-Paper)
Tuesday, June 9, 2020 / 3:40 PM - 5:10 PM / Room 209/210
Chair: Yukio Endo, AGC Inc.
Co-Chair: Kyung-Tae Kang, Korea Institute of Industrial Technology
22.1: Formation of Silicon-Based Thin Film Encapsulation for Fabrication of Highly Flexible OLED Devices
Eun Jung, Samsung Display, Yongin, South Korea
22.2: An Ultra-Thin Flexible Thin Film Encapsulation Structure with High Transmittance and Reliability
Youwei Wang, BOE Technology Group Co., Ltd., Beijing, China
22.3: Sum Thickness of Low-Retardation Plastic Foil with Gas Barrier and Transparent Conductive Layer for Bendable Devices
Hiroyuki Kinoshita, LINTER Corporation, Saitama, Japan
22.4: Development of Rolled Long Ultra-thin Glass and Its Mass Production Technology
Hiroki Mori, Nippon Electric Glass Co., Ltd., Otsu, Japan
22.5: Late-News Paper: Silicone-Based Low-k Material for Display
Brandon Swatowski, Dow Chemical, Midland, MI US

Session 23: MicroLED Display Systems (Emissive, Micro-LED, and Quantum-Dot Displays)
Tuesday, June 9, 2020 / 3:40 PM - 5:10 PM / Room 207/215
Chair: Yong-Seog Kim, Hongik University
Co-Chair: Larry Weber, Consultant
Reza Chaji, VueReal, Waterloo, ON Canada
23.2: Wrap-Around Electrodes for MicroLED Tiled Displays
David Pastel, Corning Inc., Corning, NY US
23.3: Highly Transparent, Ultra-Thin Flexible, Full Color Mini-LED Display with IGZO TFT Substrate
Yang Sun, TCL China Star Optoelectronics Technology Co. Ltd., Shenzhen, China
23.4: Full Color, Active-Matrix Micro-LED Display with Dual Gate a-IGZO TFT Backplane
Jin Jang, Kyung Hee University, Seoul, South Korea
23.5: Late-News Paper: High-Resolution Monolithic Micro-LED Full-Color Micro-Display
Xu Zhang, Hong Kong University of Science and Technology, Kowloon, Hong Kong

Session 24: LTP0 (Active Matrix Devices)
Wednesday, June 10, 2020 / 9:00 AM - 10:20 AM / Room 201/202
Chair: James Chang, Apple, Inc.
Co-Chair: Man Wong, Hong Kong University of Science & Technology
24.1: Invited Paper: Development of High Quality IGZO-TFT with Same On-Current as LTPS
Kazuatsu Ito, Sharp Corporation, Tenri, Japan

24.2: Fluorination for Enhancing the Resistance of Indium-Gallium-Zinc Oxide Thin-Film Transistor against Hydrogen-Induced Degradation
Sisi Wang, The Hong Kong University of Science and Technology, Hong Kong, China

24.3: Complementary LTPO Technology, Pixel Circuits and Integrated Gate Drivers for AMOLED Displays Supporting Variable Refresh Rates
Jiahao Kang, Royole Corporation, Fremont, CA US

24.4: High Refresh Rate and Low Power Consumption AMOLED Panel Using Top-gate n-Oxide and p-LTPS TFTs
Ryo Yonebayashi, Sharp Corporation, Tenri, Japan

Session 25: Innovative Display Driving Circuits (Display Electronics)
Wednesday, June 10, 2020 / 9:00 AM - 10:00 AM / Room 203
Chair: Ya Hsiang Tai, National Chiao Tung University
Co-Chair: Soo-Yeon Lee, Seoul National University
25.1: Multi-Bit MIP (Memory-in-Pixel)-Based Pixel Circuit of CMOS Backplane for Micro-LED Display
Jesoo Seong, Ulsan National Institute of Science and Technology (UNIST), Ulsan, UNK South Korea

25.2: LTPO TFT Technology for Level Shifter Integrated Gate Driver in UHD 4K Displays
Jin Jang, Kyung Hee University, Seoul, South Korea

25.3: Fault-Tolerant Integrated Gate Driver for Flexible Displays
Seung-Woo Lee, Kyung Hee University, Seoul, South Korea

Session 26: Novel Waveguides for AR Glasses (Augmented, Virtual and Mixed Reality / Display Systems)
Wednesday, June 10, 2020 / 9:00 AM - 10:20 AM / Room 205/213
Chair: Nikhil Balram, Google Inc.
Co-Chair: Brian Schowengerdt, Magic Leap
26.1: Chirped Polarization Volume Grating for Wide FOV and High Efficiency Waveguide-Based AR Displays
Ken Yin, University of Central Florida, Orlando, FL US

Yuning Zhang, Southeast University, Nanjing, China

26.3: Tolerancing Capabilities of Crossed Gratings Versus Linear Gratings
Alexandra Crui, WaveOptics Ltd., Abingdon, United Kingdom

26.4: Late-News Paper: Super-Light Smart Glasses Using a Thin Plastic Light Guide Plate
Shigenobu Hirano, Ricoh Company, Ltd., Ebina, Japan

Session 27: Printed OLEDs I (OLEDs)
Wednesday, June 10, 2020 / 9:00 AM - 10:20 AM / Room 216/208
Chair: Changwoong Chu, Samsung Display Corporation
Co-Chair: Yasunori Kijima, Huawei Technologies Japan K.K.
Daisuke Fukushita, Sumitomo Chemical Co., Ltd., Tsukuba, Japan

Sebastian Meyer, Merck KGaA, Darmstadt, Germany

27.3: Improved Device Performance for Inkjet Printed OLEDs via Interfacial Mixing Control
Hwong Gyu Kim, Samsung Display Co., Ltd., Yongin, South Korea

27.4: Late-News Paper: Key Materials for High Performance Solution-Process OLEDs
Koichiro Iida, Mitsubishi Chemical Corporation, Yokohama, Japan

Session 28: Seeing Through the Display (Interactive Displays and Systems)
Wednesday, June 10, 2020 / 9:00 AM - 10:00 AM / Room 211
Chair: Steven Bathiche, Microsoft
Co-Chair: Jeff Han, Consultant
28.1: Image Capture Through TFT Arrays
Neil Emerton, Microsoft Applied Sciences, Redmond, WA US

Quan Tang, Wuhan China Star Optoelectronics Technology Co., Ltd., Wuhan, China

28.3: Pixel Design for Transparent MicroLED Display with Low Blurring
Zhengu Feng, Peking University, Shenzhen, China

28.4: Investigation of Moiré Interference in Pinhole Matrix Fingerprint on Display Technology
Yang Zeng, Shanghai Tianma Microelectronics, Shanghai, China

Session 29: Flexible/Foldable Device Manufacturing (Display Manufacturing)
Wednesday, June 10, 2020 / 9:00 AM - 10:00 AM / Room 209/210

Chair: Tian Xiao, NEXT Biometrics Inc.
Co-Chair: Wei Lung Liau, AU Optronics Corp.

29.1: Invited Paper: Analysis of Dynamic Strain on Foldable Devices
Naotsugu Ando, Yuasa System, Okayama, Japan

29.2: Invited Paper: Mechanics of Bendable Glass Substrates
Timothy Gross, Corning Incorporated, Corning, NY US

29.3: WITHDRAWN

29.4: Edge Strength Measurement of Free-Form Displays
Bosun Jang, Corning Incorporated, Corning, NY US

Session 30: MicroLED Displays (Emissive, Micro-LED, and Quantum-Dot Displays)
Wednesday, June 10, 2020 / 9:00 AM - 10:20 AM / Room 207/215

Chair: Francois Templier, CEA-LETI
Co-Chair: Jean-Jacques Drolet, Ossram Opto Semiconductors

30.1: Invited Paper: Development of MicroLED Display by PixeLED Display Technology
Ying-Tsang Liu, PlayNitride Inc., Zhubei, Taiwan ROC

30.2: Invited Paper: GaN on Silicon: The Way Forward Across a Range of Micro LED Applications
Keith Strickland, Plessey Semiconductors Ltd., Plymouth, United Kingdom

30.3: Sub-Micron Full-Color LED Pixels for Micro-Displays and Micro-LED Main Displays
Seth Coe-Sullivan, NS Nanotech, Ann Arbor, MI US

30.4: MicroLED Display Technology Trends and Intellectual Property Landscape
Eric Virey, Yole Development, Portland, OR US

30.5: Late-News Paper: Glass Based High Brightness AMLED Using Dual Gate Coplanar a-IGZO TFT
Jin-Woo Choi, Samsung Display, Yongin, South Korea

Session 31: Structure Engineering (Active Matrix Devices)
Wednesday, June 10, 2020 / 10:40 AM - 11:20 AM / Room 201/202

Chair: Norbert Fruehauf, University of Stuttgart
Co-Chair: Kwon-Shik Park, LG Display

31.1: Invited Paper: The Multimodal Thin-Film Transistor (MMT): A Versatile Low-Power and High-Gain Device with Inherent Linear Response
Radu Sporea, University of Surrey, Guildford, United Kingdom

31.2: Invited Paper: Nanostructures Oxide Thin-Film Transistors Fabricated by Near-Field Nanolithography with Enhanced Device Performance
Chuan Liu, Sun Yat-sen University, Guangzhou, China

Session 32: Algorithms for Image Quality Improvement (Display Electronics)
Wednesday, June 10, 2020 / 10:40 AM - 12:00 PM / Room 203

Chair: Mainak Biswas, Google
Co-Chair: Moon-Sang Hwang, Samsung Display Co., Ltd.

32.1: Weak Sub-Color Sub-Sampling for High Resolution Image Bandwidth Reduction
JoonHee Lee, LG Display, Seoul, South Korea

32.2: Improvement in Directional Cubic Convolution Image Interpolation
Liu-Xiao Lei, Beijing BOE Optoelectronics Technology Corporation, Beijing, China

32.3: AMOLED IR Drop Compensation for Channel Length Modulation
Feng-Ting Pai, Novatek Microelectronics Corp., Hsinchu, Taiwan ROC

32.4: Late-News Paper: OLED Display Gamma LUT Optimization Based on Principal Component Analysis
Hyunchul Kim, Google Inc, Mountain view, CA US

Session 33: 3D and Holographic (Augmented, Virtual and Mixed Reality / Display Systems)
Wednesday, June 10, 2020 / 10:40 AM - 11:40 AM / Room 205/213

Chair: W. Hendrick, Collins Aerospace
Co-Chair: Zong Qin, National Chiao Tung University

33.1: Invited Paper: Tabletop True 3D Display Systems Based on Projection Light Field and Integral Imaging
Qiong-Hua Wang, Beihang University, Beijing, China

33.2: Improving Image Quality of 360-Degree Tabletop 3D Screen System
Motohiro Makiguchi, NTT Service Evolution Laboratories, Kanagawa, Japan

33.3: Viewing Angle Enhanced DMD Holographic Display with Reduced Speckle Noise
ByungHyun Lee, School of Electrical and Computer Engineering, Seoul National University, Seoul, South Korea

Session 34: Printed OLEDs II (OLEDs)
Wednesday, June 10, 2020 / 10:40 AM - 12:00 PM / Room 216/208
Chair: CC Lee, BOE Technology Group Co., Ltd.
Co-Chair: JJ Lih, CPT Technology Group

34.1: Invited Paper: Towards Efficient and Stable Printed Single-Layer OLEDs
Paul Blom, Max Planck Institute for Polymer Research, Mainz, Germany

34.2: Development of 55-inch 8K AMOLED TV by Inkjet Printing Process
Zhongyuan Wu, BOE Technology Group Co., Ltd., Hefei, China

34.3: OLED Display with High Resolution Fabricated by Electrohydrodynamic Printing
Lan Mu, South China University of Technology, Guangzhou, China

Session 35: Touch Sensing on Flexible Displays (Interactive Displays and Systems / Flexible Displays and E-Paper)
Wednesday, June 10, 2020 / 10:40 AM - 12:00 PM / Room 211
Chair: Martin Grunthaner, Apple
Co-Chair: Shiming Shi, BOE Technology Group Co., Ltd.

35.1: The Mechanism and Solution of Horizontal Line Defects by Mutual Interference of Flexible OLED and Touch Sensor
Hyeon Wook Cho, Samsung Display, Yongin, South Korea

35.2: Influence of Low Ground Mass and Moisture Touch in On-Cell Touch with Foldable AMOLED
Shih-Hsuan Huang, AU Optronics Corporation, Hsinchu, Taiwan ROC

35.3: The Application of Metal Mesh Manhattan Patterns in Flexible Touch Panel
Shuang Wang, Shanghai Tianma Micro-Electronics Co. Ltd., Shanghai, China

35.4: High Sensitive Pen Writing Solution Based on Mechanical Sensing
Hee Seoomoon, Samsung Display, Yongin, South Korea

Session 36: Novel Process for Printed Displays (Display Manufacturing / Printed Displays)
Wednesday, June 10, 2020 / 10:40 AM - 12:00 PM / Room 209/210
Chair: Toshiaki Arai, JOLED Inc.
Co-Chair: Yong Taek Hong, Seoul National University

36.1: Invited Paper: High-Resolution Induced-Electrohydrodynamic (iEHD) Jet Printing for Display
Doyoung Byun, Sungkyunkwan University, Suwon, South Korea

36.2: Invited Paper: The Latest Breakthrough of Printing Technology for Next Generation Premium TV
Jueng Gil (James) Lee, Guangdong Juhua Printed Display Technology Co. Ltd., Guangzhou, China

36.3: Novel and Simple Patterning process of Quantum dots via Transfer Printing for Active Matrix QD-LED
Soo Deok Han, University of Cambridge, Cambridge, United Kingdom

36.4: Solution-Processed Transparent Top Electrode for QD-LED
Hywel Hopkin, Sharp Laboratories of Europe Ltd., Oxford, United Kingdom

Session 37: MicroLEDs: Manufacturing and Characterization (Emissive, Micro-LED, and Quantum-Dot Displays)
Wednesday, June 10, 2020 / 10:40 AM - 12:00 PM / Room 207/215
Chair: Ioannis Kymissis, Columbia University
Co-Chair: Zhaojun Liu, Southern University of Science and Technology

37.1: Yield Statistics for Fault Tolerant Micro LED Displays
Khaled Ahmed, Intel Corporation, Santa Clara, CA US

37.2: Efficient MicroLED Display Manufacturing Necessitates New Functional Production Test Technologies to Replace Traditional LED Parametric Test
Francois Henley, Tesoro Scientific Inc., Saratoga, CA US

37.3: Power Consumption of OLED and µLED Displays
En-Lin Hsiang, University of Central Florida, Orlando, FL US

37.4: Micro LED Defect Analysis via Photoluminescent and Cathodoluminescent Imaging
Keith Behrman, Columbia University, New York, NY US

Session 38: Circuit and New Application of TFTs (Active Matrix Devices)
Wednesday, June 10, 2020 / 3:30 PM - 4:50 PM / Room 201/202
Chair: Takashi Nakamura, Japan Display Inc.
Co-Chair: Chen Xi, BOE Technology Group Co., Ltd.

38.1: Invited Paper: High-Performance Metal-Oxide Semiconductor Based Optoelectronics
Sung Kyu Park, Chung-Ang University, Seoul, South Korea

38.2: Magnifying Viewer Using Poly-Si Thin-Film Phototransistor and Liquid-Crystal Microlens Array
Matsumi Kimura, Ryukoku University, Otsu, Japan

38.3: A Novel Gate Driver Circuit Employing IGZO TFTs for External Compensation
Yaebsun Feng, BOE Technology Group Co., Ltd., Hefei, China

38.4: AMOLED Display Global Dimming Using PWM on Backgate
Lynn Verschueren, imec, Leuven, Belgium
Session 39: Advanced Pixel and Driving Circuits (Display Electronics)
Wednesday, June 10, 2020 / 3:30 PM - 4:50 PM / Room 203
Chair: Richard McCartney, Pixel Scientific, Inc.
Co-Chair: Carlin Vieri, Google
39.1: 8K Broadcast Monitor Display System
Ran Duan, BOE Technology Group Co., Ltd., Beijing, China
39.2: A 14-Gb/s Dual Mode Receiver with MIPI D-PHY and C-PHY Interfaces for Mobile Display Drivers
Tae-Jin Kim, Samsung Electronics, Hwasung, South Korea
39.3: In-Pixel Temperature Sensor for High-Luminance Active-Matrix Micro-LED Display Using LTPO TFTs
Ji Jang, Kyung Hee University, Seoul, South Korea
39.4: A Method of Panel-Current Limitation for Automotive OLED Displays
Hyun-Chang Kim, Samsung Display Co., Yongin, South Korea

Session 40: Novel Optics for HMDs (Augmented, Virtual and Mixed Reality / Emerging Technologies and Applications)
Wednesday, June 10, 2020 / 3:30 PM - 5:10 PM / Room 205/213
Chair: Susan Jones, Nulumina Corp.
Co-Chair: Gary Jones, Nanoquantum Corporation
40.1: Invited Paper: Fast-Switching Liquid Crystal Devices for Near-Eye and Head-Up Displays
Shin-Tson Wu, University of Central Florida, Orlando, FL US
40.2: Cost-Efficient Polymer Flat Lens for Chromatic Aberration Correction in Virtual Reality Displays
Tao Zhan, University of Central Florida, Orlando, FL US
40.3: A Scanning Waveguide Display with 100° FOV
Jianghao Xiong, University of Central Florida, Orlando, FL US
40.4: Demonstration of a Novel Single-Layer Double-Pass Optical Architecture for a Pupil-Matched Occlusion-Capable Optical See-Through Head-Mounted Display
Hong Hua, University of Arizona, Tucson, AZ US
40.5: Invited Paper: A Large RGB-Achromatic Metalens for Virtual/Augmented Reality Applications
Federico Capasso, Harvard University, Cambridge, MA US

Session 41: Printed OLEDs III (OLEDs)
Wednesday, June 10, 2020 / 3:30 PM - 4:50 PM / Room 216/208
Chair: DZ Peng, Tianma
Co-Chair: Yifan Zhang, Apple, Inc.
41.1: Invited Paper: Recent Technology of Printed OLED Display and Its World’s First Commercialization
Kazuhiro Noda, JOLED Inc., Kyoto, Japan
41.2: Invited Paper: Recent Developments in Inkjet-Printed OLEDs for High Resolution, Large Area Applications
Jin-Goo Kang, Samsung Display Co., Ltd., Yongin, South Korea
41.3: 17.3 Inch UHD Resolution AMOLED Panel Fabricated by Ink Jet Printing Process
Peng-Yu Chen, AU Optronics Corporation, Hsinchu, Taiwan ROC
41.4: Preparation of High Performance Top-Emission OLED for Large Size Display
Chuanjing Hu, BOE Technology Group Co., Ltd., Beijing, China

Session 42: Fingerprint Sensing Displays (Interactive Displays and Systems)
Wednesday, June 10, 2020 / 3:30 PM - 5:10 PM / Room 211
Chair: Patrick Worfolk, Synaptics
Co-Chair: Hong-Jye Hong, AU Optronics
42.1: A Controller IC for On-Display Touch and Multi-Fingerprint Sensor
Min Gyu Kim, Samsung Electronics, Hwasong, South Korea
42.2: Establishment and Simulation Optimization of Optical Fingerprint Recognition Structure in LCD Screen
Jianmou Huang, XiaMen Tianma Microelectronics Co., Ltd., Xiamen, China
42.3 Late-News Paper: Full-Screen Capacitive Fingerprint Sensor and Touch Sensor
Toshinori Uehara, Japan Display Inc., Ebina, Japan
42.4: LTPO TFT-LCD with In-Cell Optical Fingerprint Scanner
Bozhi Liu, XiaMen Tianma Microelectronics, Xiamen, China
42.5: Spoof Detection Scheme for Optical Fingerprint Sensors Under Display
Jin-Woo Kim, Samsung Display Corporation, Yongin, South Korea

Session 43: OLED Analysis and Mechanisms (OLEDs)
Wednesday, June 10, 2020 / 3:30 PM - 4:50 PM / Room 209/210
Chair: Nicholas Thompson, Universal Display Corporation
Co-Chair: Hitoshi Kuma, Idemitsu Kosan Co., Ltd.
43.1: Invited Paper: A Quantitative Microscopic Kientic Model for Efficiency Roll-Off in OLEDs
Troy Van Voorhis, MIT, Cambridge, MA US
43.2: Application of Liquid Extraction Surface Analysis (LESA)-NanoESI-Orbitrap-MS to a Degradation Analysis of Organic EL Elements
Hikaru Takano, Toray Research Center, Inc., Otsu, Japan

43.3: Ab-Initio Simulation of Doped Injection Layers
Tobias Neumann, Nanomatch GmbH, Karlsruhe, Germany

43.4: Combining Steady-State, Frequency, and Time Domain Data for a Comprehensive Analysis of Multilayer TADF OLEDs
Sandra Jenatsch, Fluxim AG, Winterthur, Switzerland

Session 44: Highly Integrated Semiconductor Information Displays (Emissive, Micro-LED, and Quantum-Dot Displays)
Wednesday, June 10, 2020 / 3:30 PM - 4:30 PM / Room 207/215
Chair: Qun Yan, Fuzhou University
Co-Chair: Kevin Gahagan, Corning Incorporated

44.1: Invited Paper: Micro-LEDs for Technological Convergence between Displays, Optical Communications, and Sensing and Imaging Systems
Martin Dawson, University of Strathclyde, Glasgow, United Kingdom

44.2: Invited Paper: More Than MicroLED: Mass Transfer of Pixel Engines for Emissive Displays
John Rogers, Northwestern University, Evanston, IL, US

44.3: Invited Paper: Integration of Additional Functionalities into the Frontplane of AMOLED Displays
Pawel Malinowski, imec, Leuven, Belgium

44.4: A Brief Survey of MicroLED Technologies
Ioannis Kymissis, Columbia University, New York, NY, US

Session 45: Conformable LCDs (Liquid Crystal Technology)
Thursday, June 11, 2020 / 9:00 AM - 10:20 AM / Room 201/202
Chair: Takahiro Ishinabe, Tohoku University
Co-Chair: Linghui Rao, Microsoft

45.1: Invited Paper: Multi-Spliced LCDs for Foldable Mobile Device - Seamless Technology and Applications
Yung Husu Wu, Innolux Corporation, Maili County, Taiwan ROC

45.2: Ultra-Narrow Border Display with a Cover Glass Using LCDs with a Polyimide Substrate
Shinichiro Oka, Japan Display Inc., Mobra, Japan

45.3: Late-News Paper: Homogeneous Alignment LCDs Could be Prime Candidate for Multiple Scene Interactive Interface and Devices
Ruizhi Yang, BOE Technology Group Co., Ltd., Beijing, China

45.4: Late-News Paper: Zero Light Leakage ADS Display Technology
Feifei Wang, BOE Technology Group Co., Ltd., Beijing, China

Session 46: Variable Refresh Rate (Display Electronics)
Thursday, June 11, 2020 / 9:00 AM - 10:20 AM / Room 203
Chair: Taesung Kim, Google LLC
Co-Chair: Bong-Hyun You, Samsung Display Co.

46.1: Invited Paper: Variable Refresh Rate Displays
Gerrit Slavenburg, NVIDIA, Santa Clara, CA US

46.2: A Novel Hybrid Frame Rate Driving Method for Low Frequency OLED Displays
Nana Xiong, Tianma Micro-Electronics Co., Ltd., Shanghai, China

46.3: Invited Paper: Image Adaptive Refresh Rate Technology for Ultra Low Power Consumption
Bonghwan You, Samsung Display, Yongin, South Korea

46.4: Novel OLED Low Frame Frequency Driving Method with Minimized Flicker
Jieliang Li, XiaMen Tianma Microelectronics, Xiamen, China

Session 47: Micro-Projection Technology (Augmented, Virtual and Mixed Reality / Display Systems)
Thursday, June 11, 2020 / 9:00 AM - 10:20 AM / Room 205/213
Chair: Satoshi Ouchi, Hitachi, Ltd
Co-Chair: Fujio Okumura, NEC Corporation

47.1: The World Smallest OLED Microdisplay Projection Device Design Methodology
Kazuchiro Inouaga, Sony Corporation, Atsugi, Japan

47.2: Solid State Projection Display Based on Angular Color Projection and MicroLED
Yongjung Wang, Photonic Crystal Co. LTD, San Jose, CA China

47.3: Invited Paper: High Brightness and RGB Integration of Eu-doped GaN-based Red LEDs for Ultra­high-resolution Micro-LED Display
Yasufumi Fujiwara, Osaka University, Osaka, Japan

47.4: Fiber Scanning Technology with Rectangle Display Area for Projection Unit
Shinsuke Onoe, Hitachi, Ltd., Tokyo, Japan
Session 48: OLED Devices I (OLEDs)
Thursday, June 11, 2020 / 9:00 AM - 10:20 AM / Room 216/208
Chair: Yasunori Kijima, Huawei Technologies Japan K.K.
Co-Chair: Denis Kondakov, DuPont
48.1: Invited Paper: Next Generation Highly Efficient and Stable Phosphorescent Emitting Materials For OLEDs
Byoung ki Choi, Samsung Electronics, Suwon, South Korea
48.2: Design Strategies of Fluorescent Dopants toward Pure Blue for Highly Efficient Top Emission OLEDs
Ryota Takahashi, Idemitsu Kosan Co., Ltd., Sodegaura, Japan
48.3: Efficiency Color-Shift Tradeoffs in Strong-Cavity, Top-Emitting OLEDs
S. Matthew Menke, 3M, Saint Paul, MN US
48.4: Toward the Achieving Excellent Longevity of Blue OLED Device: A Computation Study on Importance of the Co-Optimization of Material and Device
Sangho Jeon, Samsung Display, Yongin, South Korea

Session 49: E-Paper (Flexible Displays and E-paper)
Thursday, June 11, 2020 / 9:00 AM - 10:20 AM / Room 211
Chair: Makoto Omodani, Tokai University
Co-Chair: Keisuke Hashimoto, E Ink Holdings
49.1: Fast-Switching Electrophoretic E-Paper with Mixture of Liquid Crystal and E-ink for Charging and Rheological Optimizations
Bo-Ru Yang, Sun Yat-sen University, Guangzhou, China
49.2: Color Reproduction in Reflective Displays: Stacked CMY
Alex Henzen, South China Normal University, Guangzhou, China
49.3: Late-News Paper: Hybrid Capacitor Type Organic Electrochromic Device for Multicolor Representation
Norihisa Kobayashi, Chiba University, Chiba, Japan
49.4: Late-News Paper: Prototyping of Practical e-Tile and Estimation of its Image Impression from Distant Observers
Makoto Omodani, Tokai University, Hiratsuka, Japan

Session 50: Display Measurement Standards I (Display Measurement)
Thursday, June 11, 2020 / 9:00 AM - 10:20 AM / Room 209/210
Chair: Stephen Atwood, Eaton Corporation
Co-Chair: Thomas Fiske, Microsoft
50.1: Invited Paper: Color/White Light Output, Luminance Contours, and Colour Volume
David LeHoty, Independent, Mountain View, CA US
50.2: Measuring the Color Capability of Modern Display Systems
Euan Smith, Kaptivo Ltd, Cambridge, United Kingdom
50.3: Electro-Optical Transfer Characteristic, the Undervalued Display Feature
Michael Becker, Instrument Systems GmbH, München, Germany
50.4: Standardizing Fundamental Criteria for Near Eye Display Optical Measurements: Determining the Eye-Box
Rupal Varshneya, Night Vision Electronic Sensors Directorate Department of the Army, Fort Belvoir, VA US

Session 51: Quantum Dot Electroluminescence I (Emissive, Micro-LED, and Quantum-Dot Displays)
Thursday, June 11, 2020 / 9:00 AM - 10:20 AM / Room 207/215
Chair: Michele Ricks, EMD Performance Materials
Co-Chair: Jean-Jacques Drolet, Osram Opto Semiconductors
51.1: Invited Paper: Charge Injection Control of Cadmium-Free Quantum Dot Light-Emitting Diodes
Baek Kim, NanoPhotonica Inc., Gainesville, FL US
51.2: High Efficiency and Long Lifetime InP-Based Red Quantum Dot Light-Emitting Diodes
Jang-Hyuk Kwon, Kyung Hee University, Seoul, South Korea
51.3: Efficient InP/ZnS Quantum Dot Light-Emitting Diodes with Improved Electron Confinement
Zhenghui Wu, Southern University of Science and Technology, Shenzhen, China
51.4: QLED-on-Silicon Microdisplays with Peripheral-Circuit-Compensation Design
Sikai Su, Peking University, Shenzhen, China

Session 52: Fast Switching LCDs (Liquid Crystal Technology)
Thursday, June 11, 2020 / 10:40 AM - 12:00 PM / Room 201/202
Chair: Dr Akihito Mochizuki, I-CORE Technology, LLC
Co-Chair: Prof. Jian Gang Lu, Shanghai Jiao Tong University
52.1: Invited Paper: Liquid Crystal Materials and Devices for Displays and Photonics
Vladimir Chigrinov, Foshan University, Foshan, China
52.2: Fast-Response Liquid Crystals for AR and Head-Up Displays
Yannanxi Li, University of Central Florida, Orlando, US
52.3: Fast-Response Cloud-Point Ferroelectric Liquid Crystal Dammann Grating for LiDAR Applications
Zhengnan Yuan, The Hong Kong University of Science and Technology, Hong Kong, China
52.4: Late-News Paper: 27" 240Hz Wide View ADS Gaming LCM Development Meeting 1x ms RT and VESA HDR Standard
Session 53: Emerging Processes and Materials (Emerging Technologies and Applications)
Thursday, June 11, 2020 / 10:40 AM - 12:10 PM / Room 203
Chair: Abhishek Srivastava, Hong Kong University of Science & Technology
Co-Chair: Ian Underwood, University of Edinburgh
53.1: 2D and 3D Printed Copper Conductors from Chemically Designed Nanomaterials

Sunho Jeong, Kyung Hee University, Yongin-si, South Korea
53.2: Composite Films with Ultra-Thin Glass and Polymer for Novel Optically-Functional Films

Takeshi Murashige, Nitto Denko Corporation, Osaka, Japan
53.3: CdSe/CdS Nanorod Enhancement Film for Blue-Laser Based Visible Light Communication Systems

Jerry Cheng, The Hong Kong University of Science and Technology, Hong Kong, Hong Kong
53.4: Dielectric Metasurfaces: Design for Manufacturability

Khaled Ahmed, Intel Corporation, Santa Clara, CA US
53.5: Late-News Paper: a-IGZO TFT Based Active Matrix Pressure Sensor by Integrating ZnO Nanowires as Sensing Unit

Xuewen Shi, Institute of Microelectronics of Chinese Academy of Sciences, Beijing, China

Session 54: AR/VR Technologies (Augmented, Virtual and Mixed Reality / Display Systems)
Thursday, June 11, 2020 / 10:40 AM - 12:20 PM / Room 205/213
Chair: Sergei Yakovenko, Apple
Co-Chair: Grace Lee, Google
54.1: Improved Polarizing Film for PBS Applications in HMDs

David Aastuen, 3M Display Materials & Systems Division, St. Paul, MN US
54.2: Doubling the Pixel Density for VR Displays with a Polymer Grating

Janya Zou, University of Central Florida, Orlando, FL US
54.3: Digitally Switchable Micro-Lens Array for Integral Imaging

Hong Hua, University of Arizona, Tucson, AZ US
54.4: Prediction of Saccadic Eye Movement for Foveated Rendering

Anna Kruchinina, Lomonosov Moscow State University, Moscow, Russian Fed.
54.5: Measuring Direct Retinal Projection Displays

John Penczek, University of Colorado, Boulder, Boulder, CO US

Session 55: OLED Devices II (OLEDs)
Thursday, June 11, 2020 / 10:40 AM - 12:00 PM / Room 216/208
Chair: Sven Zimmermann, Novaled GmbH
Co-Chair: Qi Wang, eMagin Corporation
55.1: Invited Paper: Self-Assembled Cathode Patterning in AMOLED for Under-Display Camera

Zhbin Wang, OTI Lumionics Inc., Toronto, ON Canada
55.2: Methods for Overcoming the Trade-Off Between Efficiency and Lifetime of Organic Light-Emitting Diodes: OLED Lifetime Simulation

Junyoung Lee, Samsung Display Corporation, Yongin, South Korea
55.3: Efficient, Low Haze Light Extraction for OLED Displays Using Micro-Optic Patterns Imprinted on Glass

Dmitrii Kuksenkov, Corning Research & Development Corporation, Corning, NY US
55.4: Novel Methodology for Reproducibility of OLED Lifetimes and Identification of Killer Impurities

Hiroshi Fujimoto, Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera), Fukuoka, Japan

Session 56: Foldable Displays I (Flexible Displays and E-paper)
Thursday, June 11, 2020 / 10:40 AM - 12:00 PM / Room 211
Chair: Kyung Cheol Choi, KAIST
Co-Chair: Cheng-Chung Lee, ITRI
56.1: Invited Paper: Research on a Commercial Foldable AMOLED and Relevant Technologies

Shiming Shi, BOE Technology Group Co., Ltd., Beijing, China
56.2: A Foldable AMOLED Module with Excellent Bending Capability and Pencil Hardness after Low Temperature Testing

Takehiro Murao, Sharp Corporation, Kameyama, Japan
56.3: Quantitative Evaluation of Neutral-plane Splitting for Foldable Displays

Masumi Nishimura, Japan Display, Inc., Mobara, Japan
56.4: Suppression of Angular Color Shift for Foldable OLEDs by Integrating an Advanced Circular Polarizer

Wei-Feng Xu, BenQ Materials Corporation, Taoyuan, Taiwan Roc

Session 57: Display Measurement Standards II (Display Measurement)
Thursday, June 11, 2020 / 10:40 AM - 12:00 PM / Room 209/210
Chair: Udo Krueger, TechnoTeam
Co-Chair: Frank Rochow, Adviser
57.1: Spatiotemporal Noise Targets Inspired by Natural Imagery Statistics
Session 58: Quantum Dot Electroluminescence II (Emissive, Micro-LED, and Quantum-Dot Displays)
Thursday, June 11, 2020 / 10:40 AM - 12:00 PM / Room 207/215
Chair: Chang Hee Lee, Samsung Display Corporation
Co-Chair: Xiao Wei Sun, Southern University of Science and Technology
58.1: Invited Paper: Progress in High Efficiency Heavy Metal Free QD-LED Development
Christian Ippen, Nanosys, Inc., Milpitas, CA US
58.2: Active Matrix QD-LED with Top Emission Structure by UV Lithography for RGB Patterning
Yohei Nakanishi, SHARP Corporation, Tenri, Japan
58.3: High Efficient Quantum Dot Light Emitting Diodes with Blue Cadmium-Free Quantum Dots
Tatsuya Ryowa, Sharp Corporation, Tenri, Japan
58.4: Efficient Cadmium-Free Quantum Dot Light Emitting Diodes
Mo Hinwai, Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera), Fukuoka, Japan

Session 59: Privacy and Sunviewable Displays (Liquid Crystal Technology)
Thursday, June 11, 2020 / 1:30 PM - 2:50 PM / Room 201/202
Chair: Xiao-Yang Huang, Ebulent Technologies Corp
Co-Chair: Gang Xu, Huawei
59.1: FFS-Based Privacy LCD With High Contrast and Transmittance
Koji Murata, SHARP, Nara, Japan
59.2: Brightness Improvement of Reflective LCD
Xindl Ma, Beijing BOE Display Technology Co., Ltd., Beijing, China
59.3: A Transfective 31.5" IGZO-TFT LCD with Twisted VA Mode
Takahiro Sasaki, SHARP, Tenri, Japan
59.4: Late-News Paper: High Transmittance and High Charging Rate 8K 120Hz ADS LCD TV
He He Hu, BOE Technology Group Co., Ltd., Beijing, AL China

Session 60: Machine Learning for Display Algorithms and Electronics (Machine Learning for Displays / Display Electronics)
Thursday, June 11, 2020 / 1:30 PM - 2:50 PM / Room 203
Chair: Chaohao Wang, Apple Inc.
Co-Chair: Hyoungsik Nam, Kyung Hee University
60.1: Novel Image Sticking Prevention Method Using Deep Learning
Youngsook Yoo, Samsung Display, Youngin, South Korea
60.2: Self-Supervised Perceptual Motion Deblurring Using a Conditional Generative Neural Network Guided by Optical Flow
Jaihyun Koh, Samsung Display Corporation, Yongin, South Korea
60.3: Invited Paper: Machine Learning Approaches to Active Stylus for Capacitive Touch-Screen Panel Applications
Hyoungsik Nam, Kyung Hee University, Seoul, South Korea
60.4: Implementation and Optimization of FSRCNN-s Algorithm Based on SDSL Platform
Yanan Ji, TCL China Star Optoelectronics Technology Co. Ltd., Guangdong, China

Session 61: High-Resolution OLED Display Manufacturing (Augmented, Virtual and Mixed Reality / Display Manufacturing)
Thursday, June 11, 2020 / 1:30 PM - 2:30 PM / Room 205/213
Chair: Dr Robert Visser, Applied Materials
Co-Chair: Joerg Winkler, Plansee SE
61.1: A New Fine Metal Mask Pixel Patterning Technology for High Resolution OLED Displays
Chiwoo Kim, APS Holdings, Hwasungong, South Korea
61.2: 2-inch, 2000 ppi Silicon Nitride Mask for Patterning Ultrahigh-Resolution OLED Displays
Yibin Jiang, Hong Kong University of Science and Technology, Kowloon, Hong Kong
61.3: Vertically Integrated, Double-Stack Oxide-TFT Layers for High Resolution AMOLED Backplane
Ju Jang, Kyung Hee University, Seoul, South Korea
61.4: Invited Paper: Development of the OLED Mass Production System (2:30 PM - 2:50 PM)
Eiichi Matsumoto, Canon Tokki Corporation, Mitsuke Japan

Session 62: OLED Devices III (OLEDs)
Thursday, June 11, 2020 / 1:30 PM - 2:50 PM / Room 216/208
Chair: Chang-Wook Han, LG Display Co., Ltd
Co-Chair: Jang Hyuk Kwon, Kyung Hee University

62.1: **Invited Paper:** Understanding Degradation Processes of Organic Light-Emitting Devices  
Youngmin You, Ewha Womans University, Seoul, South Korea

62.2: Deep-Red and Near-Infrared OLEDs with High Efficiency and Long Lifetime for Display and Light-Source Applications  
Satoshi Seo, Semiconductor Energy Laboratory Co., Ltd., Atsugi, Japan

62.3: Design of High-Performance Tandem Blue Devices for Quantum Dot OLED Display  
Linlin Wang, Hefei BOE Joint Technology Co., Ltd., Beijing, China

62.4: Ultrathin Cu-Ag Anode for High Light Outcoupling Efficiency by Eliminating Waveguide Mode in OLED  
Yong-Bum Park, University of Michigan, Ann Arbor, MI US

Session 63: Foldable Displays II (Flexible Displays and E-paper)  
Thursday, June 11, 2020 / 1:30 PM - 2:30 PM / Room 211
Chair: Kyung Cheol Choi, KAIST
Co-Chair: Meng-Ting Lee, Huawei Technology

63.1: Numerical Study on Module Stacking Design of Flexible Panel with Water-Drop Folding Shape  
Liming Dong, BOE Technology Group Co., Ltd., Beijing, China

63.2: Continuous Observation of Neutral-Plane Splitting throughout the Folding Process of Foldable Displays Using Optical Microscopy and Digital Image Correlation Method  
Masatomo Hishinuma, Japan Display, Inc., Mobara, Japan

63.3: Translating 2 Point Bend with Step Stress Methodology  
Kurt Gerber, Corning Incorporated, Corning, NY US

Session 64: Flexible Technologies II: Measurement (Display Measurement)  
Thursday, June 11, 2020 / 1:30 PM - 2:30 PM / Room 209/210
Chair: Makoto Omodani, Tokai University  
Co-Chair: Stephen Atwood, Eaton Corporation

64.1: Separating Specular Reflection from Diffuse Haze for ePaper Using the Extended Variable Aperture Source Method  
Dirk Hertel, E Ink Corporation, Billerica, MA US

64.2: Metrology of Non-Planar Light Sources Using Near-Field Goniometric Measurement Method  
K Kalantar, Global Optical Solutions, Tokyo, Japan

64.3: Simulation of Beam Shaping by Micro-Textures for Curved Displays  
Urs Aeberhard, Fluxim AG, Winterthur, Switzerland

Session 65: Quantum Dot Electroluminescence III (Emissive, Micro-LED, and Quantum-Dot Displays)  
Thursday, June 11, 2020 / 1:30 PM - 2:50 PM / Room 207/215
Chair: Dr. Jonathan Steckel, ST Microelectronics
Co-Chair: Yajie Dong, University of Central Florida

65.1: **Invited Paper:** Enhanced Efficiency of InP-Based Red and Green Quantum Dot Light-Emitting Diodes  
Yanzhao Li, BOE Technology Group Co., Ltd., Beijing, China

65.2: High Luminescent Red Quantum Dot Light-Emitting Diodes by Inkjet Printing  
Xiao Wei Sun, Southern University of Science and Technology, Shenzhen, China

65.3: Green Top-Emission Quantum Dot Light-Emitting Diodes (TE-QLED) with Normal and Inverted Structure  
Jian-Haw Lee, National Taiwan University, Taipei, Taiwan ROC

65.4: Control of Carrier Injection and Transport Behavior in QLEDs via Modulating the Schottky Barrier  
Yong-Seog Kim, Hongik University, Seoul, South Korea

Session 66: Self-Aligned LCDs (Liquid Crystal Technology)  
Thursday, June 11, 2020 / 3:10 PM - 4:40 PM / Room 201/202
Chair: Michael Wittek, Merck KGaA
Co-Chair: Shui Chih Lien, CSOT

66.1: **Invited Paper:** Liquid Crystal Mixture with a Composition Including Highly Reliable Fluorinated Diluter and RM-Monomer for PSVA and PI-less IPS LCDs  
Toshihiro Shibata, Chiralcol Co.LTD, Saitama, Japan

66.2: **Invited Paper:** Reactive Mesogen Multi-Twist Retarders for Advanced AR/VR Displays  
Michael Escuti, ImagineOptix Corporation, Durham, NC US

66.3: The Way To Improve Black Circle Mura in Curved Display by Polyimide-Less Technology  
Wei Cui, Peking University, Shenzhen, China

66.4: Reactive Monomers Optimized for Fast Response Liquid Crystals with High Reliability  
Mei Chen, TCL China Star Optoelectronics Technology Co., Ltd., Shenzhen, China

66.5: **Late-News Paper:** Fast Response Texture Free Polymer Stabilized Vertically Aligned Liquid Crystal Displays  
Yong-Woon Lim, Samsung Display, Asan, South Korea
Session 67: Emerging Applications with Machine Learning (Machine Learning for Displays / Emerging Technologies and Applications)
Thursday, June 11, 2020 / 3:10 PM - 4:30 PM / Room 203
Chair: K Käläntär, Global Optical Solutions
Co-Chair: Fang-Cheng Lin, Apple Inc
67.1: Efficient Multi-Quality Super-Resolution Using a Deep Convolutional Neural Network for an FPGA Implementation
Min Beom Kim, LG Display Co., Ltd., Seoul, South Korea
67.2: Lightweight Tone-Mapped HDRNET with Exposure Stack Generation
So Yeon Jo, Sogang University, Seoul, South Korea
67.3: ColorNet: A Neural Network-Based System for Consistent Display of Brand Colors for Video
Erica Walker, Clemson University, Clemson, SC US
67.4: Visual Simultaneous Localization and Mapping with Deep Neural Network Based Loop Detection for Augmented Reality
Chao Ping Chen, Shanghai Jiao Tong University, Shanghai, China

Session 68: Light Field 3D (Display Systems)
Thursday, June 11, 2020 / 3:10 PM - 4:30 PM / Room 205/213
Chair: Shinichi Uehara, AGC Inc.
Co-Chair: K Käläntär, Global Optical Solutions
68.1: Investigation on Defocusing-Induced Accommodation Shift in Microlens Array-Based Near-Eye Light Field Displays
Zong Qin, Sun Yat-Sen University, Guangzhou, China
68.2: View-Dependent Light-Field Display that Supports Accommodation Using a Commercially-Available High Pixel Density LCD Panel
Ronald Azuma, Intel Labs, Santa Clara, CA US
68.3: A Super-Multiview Display with Horizontal and Vertical Parallax by Time Division and Color Multiplexing
Yuta Watanabe, University of Tsukuba, Tsukuba, Japan
68.4: Late-News Paper: 3D/2D Partially Convertible Integral Imaging Display Using Geometric Phase Lens Array
Hayato Watanabe, NHK (Japan Broadcasting Corporation), Tokyo, Japan

Session 69: OLED Devices IV (OLEDs)
Thursday, June 11, 2020 / 3:10 PM - 4:30 PM / Room 216/208
Chair: Franky So, North Carolina State University
Co-Chair: Chihaya Adachi, Kyushu University
Jaesang Lee, Seoul National University, Seoul, South Korea
69.2: Transparent Conductive Hybrid Cathode Structure for Top-Emitting Organic Light-Emitting Devices
Wei Quan, Heifei BOE Joint Technology Co., Ltd., Beijing, China
69.3: Examination of Degradation Analysis of p-i-n Type OLEDs Device
Daichi Shirakura, Toray Research Center, Inc., Otsu, Shiga, Japan
69.4: Late-News Paper: High Transparency Adhesive Encapsulation Film for OLED Device
Satoru Ohashi, Ajinomoto Fine-Techno Co., Inc., Kawasaki, Japan

Session 70: Flexible Technologies III (Flexible Displays and E-paper)
Thursday, June 11, 2020 / 3:10 PM - 4:30 PM / Room 211
Chair: Yong Taek Hong, Seoul National University
Co-Chair: Simon Kang, Apple
70.1: Invited Paper: Advances in the Development of Flexible AMOLED Display
Ze Yuan, Royole Corporation, Fremont, CA US
70.2: Invited Paper: Low Temperature Process and Material Development for Flexible/Stretchable Transparent Conductor
Seung Hwan Ko, Seoul National University, Seoul, South Korea
70.3: Flexible OLED Display with 620 Degree Celsius LTPS TFT and Touch Sensor Manufactured by Weak Bonding Method
Tsung-Ying Ke, AU Optronics Corp., Hsinchu, Taiwan ROC
70.4: Flexible OLED-based Photonic Skin for Attachable Phototherapeutics
Kyung Cheol Choi, Korea Advanced Institute of Science and technology (KAIST), Daejeon, South Korea

Session 71: Spatial Uniformity (Display Measurement)
Thursday, June 11, 2020 / 3:10 PM - 4:30 PM / Room 209/210
Chair: Thomas Fiske, Microsoft
Co-Chair: Frank Rochow, Adviser
71.1: Fractional Pixel Method for Improved Pixel-Level Measurement and Correction (Demura) of High-Resolution Displays
Douglas Kreyssar, Radiant Vision Systems LLC, Redmond, WA US
71.2: Subpixel Non-Uniformity Correction for Displays
Xiaofan Feng, Jingoe Electronic (USA), Camas, WA US
71.3: Meeting Optical Testing Challenges of High-Resolution µLED-Displays
Martin Wolf, Instrument Systems GmbH, Munich, Germany
Session 72: Quantum Dot Electroluminescence IV (Emissive, Micro-LED, and Quantum-Dot Displays)
Thursday, June 11, 2020 / 3:10 PM - 4:30 PM / Room 207/215
Chair: Kevin Gahagan, Corning Incorporated
Co-Chair: Yanzhao Li, BOE Technology Group Co., Ltd.
72.1: **Invited Paper:** Realizing Long Lifetime Blue Quantum Dots Light Emitting Diodes (QLEDs) through Quantum Dot Structure Tailoring
Yixing Yang, TCL Corporate Research, Shenzhen, China
72.2: **Highly Efficient Cadmium-Free Quantum Dot Light-Emitting Diodes Employing Top-Emitting Architecture**
Myoungjin Park, Samsung Display Co., Ltd., Yongin, South Korea
72.3: **Influence of Mobility Effect on Top-Emission Red Quantum Dot Light Emitting Diode with Weak-Cavity Structure**
Ming-Yi Lin, National United University, Miaoli, Taiwan ROC
72.4: **Spectrum Narrowing and Efficiency Enhancement of Quantum Dot Light-Emitting Diodes by Microcavity**
Xiao Wei Jie, Southern University of Science and Technology, Shenzhen, China

Session 73: Displays and Health (Applied Vision / Lighting)
Friday, June 12, 2020 / 9:00 AM - 10:20 AM / Room 201/202
Chair: Chien-Yu Chen, National Taiwan University of Science & Technology
Co-Chair: Marina Kondakova, OLEDWorks
73.1: **Invited Paper:** Pediatric Device Use: Implications for Myopia Development
Elise Harb, UC Berkeley School of Optometry, Berkeley, CA US
73.2: **Invited Paper:** Effects of Displays on Myopia and Possible Countermeasures Based on Epidemiology in Japan
Takashi Kawamura, Kitasato University, Sagamihara, Japan
73.3: **Invited Paper:** Influences of Circadian Illuminances from Lighting and TV on the Human Locomotor Activity, Sleep Disorder, EEG, HRV, and Melatonin Secretion
Dae Hwan Kim, Kookmin University, Seoul, South Korea
73.4: **Invited Paper:** Are Displays Giving Us the Blues?
John Bullough, Renselaer Polytechnic Institute, Troy, NY US

Session 74: Seeing Through the Display Image Reconstruction Techniques (Machine Learning for Displays / Interactive Displays and Systems)
Friday, June 12, 2020 / 9:00 AM - 10:00 AM / Room 203
Chair: Steven Bathiche, Microsoft
Co-Chair: Jeff Han, Consultant
74.1: **Image Restoration for Display-Integrated Camera**
Sehoon Lim, Microsoft Applied Sciences, Redmond, WA US
74.2: **Diffracted Image Retrieving with Deep Learning**
Seungin Baek, Samsung Display, Yongin, South Korea
74.3: **Image Deblur of Camera Under Display by Deep Learning**
Hu Zhang, Lenovo Research, Beijing, China

Session 75: Display Systems and Backlights (Display Systems)
Friday, June 12, 2020 / 9:00 AM - 10:20 AM / Room 205/213
Chair: Jean-Pierre Guillou, Apple, Inc.
Co-Chair: Masaru Suzuki, Kriya Materials
75.1: **Invited Paper:** Digital Signage: Advances, Requirements, and Solutions
Michael Schmid, Ströer SE & Co. KGaA, Köln, Germany
75.2: **Design Criteria in the Development of Anti-Glare Surfaces**
Brett Sitter, 3M, Saint Paul, MN US
75.3: **Highly Collimated Backlight for Liquid Crystal Displays**
Brecht Berteloot, Ghent University, Ghent, Belgium
75.4: **All-Glass Light Guide Plate with Tapered Lenticular Lens Array by Mask and Etch**
Shenping Li, Corning Research & Development Corporation, Corning, NY US

Session 76: OLED Displays I (OLEDs)
Friday, June 12, 2020 / 9:00 AM - 10:20 AM / Room 216/208
Chair: Yifan Zhang, Apple, Inc.
Co-Chair: DZ Peng, Tianma
76.1: **Invited Paper:** Electroforming Fine Metal Mask for High Resolution OLED Displays
Xialing Chen, Changzhou U.G.Oled Technology Co., Ltd., Changzhou, China
76.2: **A High Image Quality OLED Display with Motion Blur Reduction for Ultra-High Resolution and Premium TVs**
Session 77: Free Form Displays I (Flexible Displays and E-paper)
Friday, June 12, 2020 / 9:00 AM - 10:20 AM / Room 211
Chair: Jennifer Lin, AU Optronics
Co-Chair: Hajime Yamaguchi, Japan Display Inc.
77.1: Design of Stretchable AMOLED Display with Transitional Area
Qian Yang, BOE Technology Group Co., Ltd., Beijing, China
77.2: Stretchability Improvement of stretchable OLED by Rotation Plate Structure and Pillar Array Substrate
Young Hyun Son, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea
77.3: Wearable Organic Light-Emitting Diode Displays – From Fibers to Textiles
Sung-Min Lee, Konkuk University, Seoul, South Korea
77.4: High Efficiency Flexible Fiber-Based Light-Emitting Devices Processed by Phosphorescent Solution
Kyung Cheol Choi, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea

Session 78: Novel Display Applications (Emerging Technologies and Applications)
Friday, June 12, 2020 / 9:00 AM - 10:20 AM / Room 209/210
Chair: Gary Jones, Nanoquantum Corporation
Co-Chair: Vincent Gu, Apple, Inc.
78.1: Invited Paper: Application of OLED Area Light in Textiles: Approaches, Challenges, Limitations and Perspectives
Jan Hesse, Fraunhofer FEP, Dresden, Germany
78.2: Using Physical Books as Interfaces to Digital Displays
Georgios Bairaktaris, University of Surrey, Guildford, United Kingdom
78.3: Vein Detection with Near-infrared Organic Photodetectors for Biometric Authentication
Daniel Tordera, TNO / Holst Centre, Eindhoven, Netherlands
78.4: IGZO-Based Identification Tags Communicating with Everyday Touchscreens
Nikolaos Papadopoulos, imec, Leuven, Belgium

Session 79: Quantum Dot Color Conversion I (Emissive, Micro-LED, and Quantum-Dot Displays)
Friday, June 12, 2020 / 9:00 AM - 10:20 AM / Room 207/215
Chair: John Van Derlofske, 3M
Co-Chair: Seth Coe-Sullivan, Luminit, LLC
79.1: Invited Paper: A New Generation of QD Diffusion Plate Technology for TV
Honglei Ji, TCL Electronics Holdings Limited, Shenzhen, China
79.2: Ambient Light Excitation in Quantum Dot-Converted Micro-LED Displays
Fangwang Gu, University of Central Florida, Orlando, FL US
79.3: Color Conversion Enhancement of Perovskite Quantum Dots by Integrating with Cholesteric Liquid Crystals
Su Pan, TCL China Optoelectronics Technology Co. Ltd., Shenzhen, China
79.4: Theoretical Prediction of Changes in Spectra of InP- and InGaP-Based Quantum Dots and Comparison with Experimental Measurement of InP-Based Quantum Dots
Senegon Baek, Samsung Display, Yongin, South Korea
79.5: Late-News Paper: Bright and Narrow Green Emitting InP-based Quantum Dots for Wide Color Gamut Displays
Eunjoo Jang, Samsung Electronics, Suwon, South Korea

Session 80: Color Perception (Applied Vision)
Friday, June 12, 2020 / 10:40 AM - 12:20 PM / Room 201/202
Chair: Youngshin Kwak, Ulsan National Institute of Science and Technology
Co-Chair: Youn Jin Kim, Xiaomi Corporation
80.1: OLED Gamut Mapping Method to Generate Exact Standard Color Results
Jongwon Park, Samsung Display Co., Ltd., Yongin, South Korea
80.2: Spatiochromatic Model for Image Quality Prediction of High Dynamic Range and Wide Color Gamut Content
Robert Wanat, Dolby Laboratories, Inc, Sunnyvale, CA US
80.3: Immanent Dichromaticity in Trichromatic Observer: 2nd Coordinate in MDS Analyses of R-G Neutral- and Y-B Only Changed-Stimuli Reflects Chromatic Saliency
Shoko Hira, Kagoshima University, Kagoshima, Japan
Sakae Ohtsuka, Kagoshima University, Kagoshima, Japan
80.5: An Experimental Study of the Effect of Subpixel Arrangements on Subjective Spatial Resolution
Midori Tanaka, Chiba University, Chiba, Japan
Session 81: Machine Learning for Manufacturing and Calibration (Machine Learning for Displays / Display Manufacturing / Display Measurement)
Friday, June 12, 2020 / 10:40 AM - 12:20 PM / Room 203
Chair: Dr. Andriy Romanyuk, Glas Trosch AG
Co-Chair: Stephen Atwood, Eaton Corporation
81.1: **Invited Paper**: Data Augmentation for Applying Deep Learning to Display Manufacturing Defect Detection
   Wei Xiong, Samsung Electronics, Co., Ltd., San Jose, CA US
81.2: **Invited Paper**: Neural Network Based Quantitative Evaluation of Display Non-Uniformity Corresponds Well with Human Visual Evaluation
   Yusuke Bamba, EIZO Corporation, Hakusan, Japan
81.3: **Array Defect Detection and Repair Based on Deep Learning**
   Kai Guo, BOE Technology Group Co., Ltd., Beijing, China
81.4: **Image Quality Prediction System in Display Fabrication Process**
   Yongwoo Lee, Samsung Display, Yongin, South Korea

Session 82: Projectors and Light Sources (Display Systems)
Friday, June 12, 2020 / 10:40 AM - 12:00 PM / Room 205/213
Chair: David Eccles, Collins Aerospace
Co-Chair: Hidekazu Hatanaka, Ushio Inc.
82.1: **Invited Paper**: Latest Status of Blue and Green Laser Diodes and Laser Packages for Display Applications
   Eiichiro Okahisa, Nichia Corporation, Toushima, Japan
82.2: **Invited Paper**: Latest Progress of Laser Phosphor Projection Display
   Fei Hu, Apptronics, Shenzhen, China
82.3: **Red-Enhanced Laser Phosphor Light Source with Quantum Dot Conversion Layer**
   Tomohiro Kaji, Sony Corporation, Atsugi, Japan
82.4: **Speckle Reduction in Laser Projectors by Angular, Wavelength, and Polarization Diversities**
   Hirotaka Yamada, Ushio Inc., Hyogo, Japan

Session 83: OLED Displays II (OLEDs)
Friday, June 12, 2020 / 10:40 AM - 12:00 PM / Room 216/208
Chair: Chihaya Adachi, Kyushu University
Co-Chair: Chang-Wook Han, LG Display Co., Ltd
83.1: **Invited Paper**: Optimization of High Performance Deep Red OLEDs Using Tandem Structure for Automotive Lighting Application
   Huiqing Pang, Beijing Summer Sprout Technology Co., Ltd., Beijing, China
83.2: **Reliability Characterization of Luminance Degradation of OLED Mobile Display Considering Color Difference Index Based on Usage Patterns**
   Yoonsuk Choi, Technology Quality Reliability, Samsung Display Co. Ltd., Yongin, South Korea
83.3: **TE-Type AMOLED Display with Wide Viewing Angle and Ultra-Low Reflectance**
   Kaoru Abe, Sharp Corporation, Sakai, Japan
83.4: **techniques to Achieve an AMOLED Display with Ultra-Narrow Border**
   Quan Liu, Kunshan Govisionox Optoelectronics Co., Ltd., Kunshan, China

Session 84: Free Form Displays II (Flexible Displays and E-paper)
Friday, June 12, 2020 / 10:40 AM - 12:10 PM / Room 211
Chair: Paul Drzaic, Apple, Inc.
Co-Chair: Joon Young Yang, LG Display Co. Ltd
84.1: **Invited Paper**: 30-inch 4K Rollable OLED Display
   Tohru Sonoda, Sharp Corporation, Osaka, Japan
84.2: **Study on Reliability for Impact and Rolling of Film Stacks in Rollable AMOLED Display by Finite Element Analysis**
   Aries Cheng, Tianma Micro- Electronics Group, Wuhhan, China
84.3: **Invited Paper**: Advanced Cover Window and Thin-film Encapsulation Technologies for Foldable AMOLED Display
   Kuang-Jung Chen, ITRI, Hsinchu, Taiwan ROC
84.4: **New Barrier Fabrication Method Based on an Infiltration Technology for Flexible OLED Displays**
   Seung Hun Kim, Samsung Display, Yongin, South Korea
84.5: **Late-News Paper**: Flexible Cover Window Film with Improved Optical Clarity
   Min Sang Park, SK Innovation, Daejeon, South Korea

Session 85: Novel Displays and Optics (Emerging Technologies and Applications)
Friday, June 12, 2020 / 10:40 AM - 12:10 PM / Room 209/210
Chair: Timothy Large, Microsoft Corp
Co-Chair: Adi Abileah, Adi - Displays Consulting LLC

85.1: Invited Paper: Organic LCDs Using Polarisers as Substrates - Enabling Pixel Level Dimming in Dual Cell LCDs  
James Harding, FlexEnable, Cambridge, United Kingdom

85.2: Invited Paper: Fourth Gen Optics - Planar Optics Revolutionized by LCD Technology  
Nelson Tabilvan, BEAM Engineering for Advanced Measurements Co., Orlando, FL US

85.3: In-Cell Optical Compensation Technology for OLED Demura Application  
Yunke Qin, BOE Technology Group Co., Ltd., Beijing, China

85.4: Enhancing Ambient Viewing Performance of Anisotropic Nano-Structure Light Control Film  
Lung-Hai Wu, BenQ Materials, Taoyuan, Taiwan ROC

85.5: Late-News Paper: Real Time Dynamic Holographic Display Based on Perovskite Doped Liquid Crystal  
Gufeng He, Shanghai Jiao Tong University, Shanghai, China

Session 86: Quantum Dot Color Conversion II (Emissive, Micro-LED, and Quantum-Dot Displays)  
Friday, June 12, 2020 / 10:40 AM - 12:00 PM / Room 207/215  
Chair: Jean-Jacques Drolet, Osram Opto Semiconductors  
Co-Chair: John Van Derlofske, 3M

86.1: Invited Paper: Nano-particle heat sinking for quantum-dot colour conversion  
Jinhyun Cho, Samsung Electronics, Suwon, South Korea

86.2: Color Conversion Using Quantum Dots for LCD, OLED and MicroLED Displays  
Ravisubhash Tangirala, NanoSys Inc, Milpitas, CA US

86.3: Ultra-Stable Deep-Dyed Perovskite-Polymer Composites as Tunable Downconverters  
Caicai Zhang, University of Central Florida, Orlando, FL US

86.4: Invited Paper: The Past, the Present and the Future of Perovskite QDs  
Norman Lüchinger, Avantama AG, Stafa, Switzerland

86.5: Late-News Paper: Giant Shell Quantum Dots for Color Conversion and as Active Material in QLEDs  
Jan Niehaus, Fraunhofer CAN, Hamburg, Germany

Poster Session  
Thursday, June 11, 2020 / 5:00 PM - 8:00 PM / Grand Ballroom B at the Hilton San Francisco Union Square  

Active Matrix Devices

P.1: New P-Type LTPS Pixel Circuit with Negative Feedback for AMOLED Smartwatch Displays  
Chih-Lung Lin, National Cheng Kung University, Tainan, Taiwan ROC

P.2: Hydrogenated SnO for p-Channel Oxide Thin Film Transistor  
Kenji Nomura, University of California, San Diego, La Jolla, CA US

P.3: Effects of Negative Bias Illumination Stress on IGZO Device and Luminance Behaviors in OLED Display Panel Operated by AC Conditions  
Jiju Im, Samsung Display Co., Ltd., Yongin, South Korea

P.4: Enhanced the Scalability and the Reliability of High Mobility Elevated-Metal Metal-Oxide Thin-Film Transistors with Bandgap Engineering  
Zhihe Xia, Department of Electronic and Computer Engineering, The Hong Kong University of Science and Technology, Hong Kong, Hong Kong

P.5: Compact Modeling of Independent Dual Gate TFTs and OLED for Display Panel Circuit Simulations  
Jiahao Kang, Royole Corporation, Fremont, CA US

P.6: Four-Sided Micro-Border 8K4K LCD with Oxide-Micro-Border 8K4K LCD with Oxide-TFT Gate Driver Embedded Array  
ManHong Na, AU Optronics Corp., Hsinchu, Taiwan ROC

P.7: Improvement of Electrical Stability of In-Ga-Zn-O Thin-Film Transistors by Incorporation of Polytetrafluoroethylene in the Back Channel Region  
Hyun Jae Kim, Yonsei University, Seoul, South Korea

P.8: Degradation Model of LTPS TFT under Off-State Bias Stress on Flexible Substrate  
Kihwan Kim, Samsung Display, Yongin, South Korea

P.9: Timing Model and Maximum-Aperture Pixel Design of an Active-Matrix Display  
Xuchi Liu, Department of Electronic and Computer Engineering, The Hong Kong University of Science and Technology, Hong Kong, Hong Kong

P.10: Advantages of Active Pixel Circuit Using Gap-Type TFT as the Photo Device to Sense Low Intensity Light  
Cheng-Che Tu, National Chiao Tung University, Hsinchu, Taiwan ROC

P.11: High Performance All-Solution Processed InZnO Thin-Film Transistors via Photo-Functionalization at Varying Fluence and Annealing Environment  
Dianne Corsino, Nara Institute of Science and Technology, Ikoma, Japan

P.12: A Robust a-IGZO TFT Integrated Scan/Emission Driver with Dynamic Inverter for AMOLED Display  
Lei Tengteng, Peking University, Shenzhen, China

P.13: Large Subthreshold Swing of LTPS TFTs by Efficient Annealing Method for Light Emitting Diode Displays  
Takao Saito, Sharp Corporation, Taka, Japan

P.14: Electrical Characteristics of P3HT:TIPS-Pentacene Blend Organic Thin-Film Transistor Under Light Irradiation  
Hyoung Shin, Hongik University, Seoul, South Korea

P.15: Thermal Conductivity Measurement of Indium-Gallium-Zinc-Oxide Thin Films Utilizing Three-Omega Method  
Reiji Hattori, Kyushu University, Fukuoka, Japan

P.16: Homojunction Indium–Gallium–Zinc Oxide Thin-Film Transistors by Selective Simultaneous UV and Thermal Treatment  

Hyon Jae Kim, Yonsei University, Seoul, South Korea

P.17: Low-Temperature, Solution-Processed Inorganic p-Channel Cu-based Thin-Film Transistors and Circuits
Eva Bestelink, University of Surrey, Guildford, United Kingdom

P.18: Ultra-Compact Multi-Level Digital-to-Analog Converter Based on Linear Multimodal Thin-Film Transistors
Ao Liu, POSTECH, Pohang, South Korea

P.19: A Study of Oxide TFT Vth Shift Behavior by Characterizing with Nano-Scale SIMS
Jung Hwa Park, Samsung Display Co. Ltd., Youngjin, South Korea

P.191: Late-News Poster: Effects of Channel Doping on Flexible LTPS TFTs: Density of State, Generation Lifetime and Image Sticking
Hong Hua, University of Arizona, Tucson, AZ US

P.192: Late-News Poster: Study of IGZO Dual Gate with BCE Structure in a Touch In-Cell Smartphone
Ping Sheng Kuo, Mantix Display Technology, Putian, China

P.193: Late-News Poster: A Novel Charge Based TFT Compact Model Applicable to Image Retention Simulation of AMOLEDs
Eva Bestelink, University of Surrey, Guildford, United Kingdom

P.194: Late-News Poster: Selenium 4p Orbital Enables High Mobility p-Type Tin Oxyselenide Semiconductor for the Thin-Film Transistor Application
Jae Kyeong Jeong, Hanyang University, Seoul, South Korea

P.195: Late-News Poster: Visual Advantages of Curved Displays for Working Efficiency
YungKyung Park, Ewha Womans University, Seoul, South Korea

P.20: Image Distortion and Image Correction of Curved OLED Displays
Po-Jui Chen, National Taiwan University, Taipei, Taiwan ROC

P.21: A New Perceptual-Driven Approach to Foveated Head-Mounted Displays
Hong Hua, University of Arizona, Tucson, AZ US

P.22: Correlation Analysis for Subjective and Non-Subjective Evaluation of Holograms Generated by Digital and Analog Spatial Light Modulators
Chih-Hao Chung, National Taiwan University, Taipei City, Taiwan ROC

P.23: A Subjective Method for Evaluating Foveated Image Quality in HMDs
Vijayaraghavan Thirumalai, Samsung Display America Lab, San Jose, CA US

P.24: The Visual Effect Evaluation of High Frame Rate Gaming LCD
Jian Chen, XiaMen Tianma Microelectronics Co., Ltd., Xiamen, China

P.25: Effects of Image Distance on Cognitive Tunneling with Augmented Reality Head Up Displays
Joe Pullukat, NS International, Ltd., Troy, MI US

P.26: Development of Image Enhancement Technology for 3D-HUD
Ryo Tadauchi, KYOCERA Corporation, Shiga, Japan

P.27: See-Through Projection System with Dot Matrix Phosphor Screen
Yu-Chen Chuah, National Chiao Tung University, Hsinchu, Taiwan ROC

P.28: Ray Tracing Simulation of Automotive Displays using Spectroscopic Polarized Emissive and Reflective Measurements
Pierre Boher, United Visual Researchers, Paris, France

P.29: Intelligent Automotive Projection Headlight with Non-Uniform DMD Illumination
Kenneth Li, Autonomous Technologies Inc., Westlake Village, CA US

P.30: The Influence of Mechanical Characteristics on the Performance of Optical laminating Materials in Automotive applications
Seung-A Lee, Sungkyunkwan University, Suwon, South Korea

P.31: Full Screen with High Refresh Frequency-120HZ and Low Power Consumption-30HZ for 5G
Ya-Chun Chang, BenQ Materials Corporation, Taoyuan, Taiwan ROC

P.32: Novel Gate Driving Circuit Integrated within Active Area Based on Amorphous Oxide TFT
MingXin Wang, Nanjing CEC Panda LCD Technology Co., Ltd., Nanjing, China

P.33: A High Current-Drive, Step-Up Capacitive Power Converter for Display Driver
Min Zhang, Peking University, Shenzhen, China

P.34: New P-type Gate Driver Circuit with Simultaneous and Progressive Output Waveforms Per Frame for AMOLED Displays with Simultaneous Emission Driving
Chih-Lung Lin, National Cheng Kung University, Tainan, Taiwan ROC

P.35: Applying Human Vision Science to Construct a Subpixel Rendering Algorithm for Displays with non-RGB-Stripe Patterns
Highly Reliable a-IGZO TFT Gate Driver Circuit to Prevent Leakage Path in Depletion Mode
Yong-Sang Kim, Sungkyunkwan University, Suwon, South Korea

Capacitive Sensor Circuit Using Photo-patternable Ionic PUA Based Coplanar a-InGaZnO TFTs
Hoi-Jin Lee, Soongsil University, Seoul, South Korea

A New Pixel Architecture for Low-Power LCDs with Oxide TFTs
Seung-Woo Lee, Kyung Hee University, Seoul, South Korea

A Current-Sensing Comparator for AMOLED Displays with External Compensation
Hairong Jiang, Peking University, Shenzhen, China

Glass Substrate Charging in Flat Panel Display Manufacturing
Robert Manley, Corning Incorporated, Corning, NY US

Mechanical Reliability of Glass in Curved Displays
Bosun Jang, Corning Incorporated, Corning, NY US

Novel Stress Profile for Chemically Strengthened Glass with High Drop Strength
Tomonori Ichimaru, Nippon Electric Glass Co., Ltd., Otsu, Japan

Application of High Stiffness Glass Substrate for Multi-Functional Large Area Displays
Kazutaka Hayashi, AGC Inc., Yokohama, Japan

Molybdenum Film Residual Stress on Cupper/Molybdenum Interface and Undercut Performance
Li Guo, Peking University, Shenzhen, China

Effect of Gas Flow Ratio of Ar and O2 During Sputtering of InZnO Active Layer on Photocurrent and Responsivity Characteristics of a-InZnO TFT
Changhui Fan, Peking University, Shenzhen, China

Fabrication and Characterization of Thick Cupper Film Deposited on G8.5 LCD Glass Substrate for 8k and Large TV Panel
Li Guo, Peking University, Shenzhen, China

Influences of Molybdenum Film Residual Stress on Cupper/Molybdenum Interface and Undercut Performance
Li Guo, Peking University, Shenzhen, China

ITO Electrode Impact on the White Color Uniformity of TFT-LCD
Hui An, BOE Technology Group co., Ltd., Hefei, China

The Ultimate Solution: Belt Plane Source Evaporators for Future AMOLED and QD OLED TV
Changhun Hwang, OLEDON, Yongin, South Korea

New Monitoring Method for Ion Implanter Using Microwave Photoconductive Response in Large-Size Glass
Steve Jeons, BOE Display Technology Co., Ltd, Hsinchu, Taiwan Roc

Preparation of Patternable High Resolution and High Refractive Index Materials for AR/VR
Jiro Hikida, Tokyo Oku Kogyo Co., Ltd, Samukawa, Japan

Properties of Diffraction Optical Elements on the Base of Diseptic Liquid Crystal for Display Applications
Victoria Belyaev, Moscow Region State University, Lobnya, Russian Fed.

An Analytical Method of Small Size Module Waving Based on the Finite Element Simulation
Xiaohua Li, Wuhan China Star Optoelectronics Technology Company Limited, Wuhan, China

Single-Step Plasma-Enhanced Chemical Vapor Deposition of Graphene on Cu Ink and Sputtered Cu Thin Films
Nai-Chang Yeh, California Institute of Technology, Pasadena, CA US

Research on the Key Factors Affecting the LC Margin Lower Limit of LCD
Le Liu, TCL China Star Optoelectronics Technology Co., Ltd., Shenzhen, China

Late-News Poster: Laser Assisted Plasma Enhanced Chemical Vapor Deposition for Damage-Resistive and Reliable Thin Film Encapsulation of Organic Light Emitting Diodes
Kyungtae Kang, Korea Institute of Industrial Technology, Ansan, South Korea

Effect of Viewpoints of Integral Image 3D Display on Human Eye Accommodation Response
Huan Deng, Sichuan University, Chengdu, China

Measurements of Viewing Angle and Angular Resolution of Electronic Holographic Display
JEHO NAM, Electronics and Telecommunications Research Institute (ETRI), Daejeon, South Korea

Micro Optics Array for Aerial Display System and its Imaging Performance Evaluation Method
Hayato Kikuta, Japan Electronics and Information Technology Industries Association (JEITA), Tokyo, Japan

Analysis on Local Area Cell Parameter Distribution Caused by Different Dosage on Photo Alignment PI of FFS Mode LCD

Surface Energy Control for Rework of OLED Display Module with Optical Clear Adhesive
Byang-Min Park, Dankook University, Cheonan, South Korea

Smooth Edge Curve Compensation Method for Circular Display
Chien Ming Ko, AU Optronics Corporation, Hsinchu, Taiwan roc

Preparation of Patternable High Resolution and High Refractive Index Materials for AR/VR
Jiro Hikida, Tokyo Oku Kogyo Co., Ltd, Samukawa, Japan

Properties of Diffraction Optical Elements on the Base of Diseptic Liquid Crystal for Display Applications
Victor Belyaev, Moscow Region State University, Lobnya, Russian Fed.

Single-Step Plasma-Enhanced Chemical Vapor Deposition of Graphene on Cu Ink and Sputtered Cu Thin Films
Nai-Chang Yeh, California Institute of Technology, Pasadena, CA US

Research on the Key Factors Affecting the LC Margin Lower Limit of LCD
Le Liu, TCL China Star Optoelectronics Technology Co., Ltd., Shenzhen, China

Late-News Poster: Laser Assisted Plasma Enhanced Chemical Vapor Deposition for Damage-Resistive and Reliable Thin Film Encapsulation of Organic Light Emitting Diodes
Kyungtae Kang, Korea Institute of Industrial Technology, Ansan, South Korea

Effect of Viewpoints of Integral Image 3D Display on Human Eye Accommodation Response
Huan Deng, Sichuan University, Chengdu, China

Measurements of Viewing Angle and Angular Resolution of Electronic Holographic Display
JEHO NAM, Electronics and Telecommunications Research Institute (ETRI), Daejeon, South Korea

Micro Optics Array for Aerial Display System and its Imaging Performance Evaluation Method
Hayato Kikuta, Japan Electronics and Information Technology Industries Association (JEITA), Tokyo, Japan

Analysis on Local Area Cell Parameter Distribution Caused by Different Dosage on Photo Alignment PI of FFS Mode LCD
Display Systems

P.66: Overview of International Standardization for Optical Fundamental Measurement of Eyewear Displays
Kun Tsai Huang, HSD, Tainan, Taiwan ROC
P.67: Analysis of Random Depolarization Films with Birefringent Micro-Particles for Liquid-Crystal and OLED Displays
Shizuki Sasaki, Keio University, Tokyo, Japan
P.68: Proposal of Novel Polymer Materials with No Birefringence over Wide Temperature Range
Kohhei Watanabe, Keio University, Tokyo, Japan
P.69: Analysis of Light Transmittance of Rugged LCDs in Random Vibration Environment
Qibin Feng, Hefei University of Technology, Hefei, China

3D Displays

P.70: Elimination of Double Images and Stray Light of a Light Field Virtual Reality Near-to-Eye Display
Hung-Ta Chien, Coretronic Corporation, Hsinchu, Taiwan ROC
P.71: Concept of Stereoscopic Full-Screen Resolution Flicker-Free Imaging of Two Three-Dimensional Scenes Simultaneously for Two Observers Using a Single 120 Hz Amplitude-Polarization Imager
Vasily Ezhov, Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russian Fed.
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