ADVANCE PROGRAM

2018 DISPLAY WEEK INTERNATIONAL SYMPOSIUM

May 22-25, 2018 (Tuesday – Friday)
Los Angeles Convention Center
Los Angeles, California, US

Session 1: Annual SID Business Meeting
Tuesday, May 22 / 8:00 – 8:20 am / Concourse Hall 151-153

Session 2: Opening Remarks / Keynote Addresses
Tuesday, May 22 / 8:20 – 10:20 am / Concourse Hall 151-153
Chair: Cheng Chen, Apple, Inc., Cupertino, CA, US

2.1: ***Keynote Address 1:*** *Deqiang Zhang, Visionox*
2.2: ***Keynote Address 2:*** *Douglas Lanman, Oculus*
2.3: ***Keynote Address 3:*** *Hiroshi Amano, Nagoya University*

Session 3: AR/VR I: Display Systems *(AI and AR & VR / Display Systems / Emerging Technologies and Applications)*
Tuesday, May 22, 2018 / 11:10 am - 12:30 pm / Room 515A
Chair: *David Eccles, Rockwell Collins*
Co-Chair: *Vincent Gu, Apple, Inc.*

3.1: ***Invited Paper:*** **VR Standards and Guidelines**
Matthew Brennesholtz, Brennesholtz Consulting, Pleasantville, NY, US
3.2: ***Distinguished Paper:*** **An 18 Mpixel 4.3-in. 1443-ppi 120-Hz OLED Display for Wide-Field-of-View High-Acuity Head-Mounted Displays**
Carlin Vieri, Google LLC, Mountain View, CA, US
3.3: ***Distinguished Student Paper:*** **Resolution-Enhanced Light-Field Near-to-Eye Display Using E-Shifting with an Birefringent Plate**
Kuei-En Peng, National Chiao Tung University, Hsinchu, Taiwan, ROC
3.4: **Doubling the Pixel Density of Near-to-Eye Displays**
Tao Zhan, College of Optics and Photonics, University of Central Florida, Orlando, FL, US
3.5: **RGB Superluminescent Diodes for AR Microdisplays**
Marco Rossetti, Exalos AG, Schlieren, Switzerland

Session 4: Quantum-Dot and Emissive Materials Synthesis *(Quantum Dots and Micro-LEDs / Emissive Displays)*
Tuesday, May 22, 2018 / 11:10 am - 12:30 pm / Room 515B
Chair: *Brandi Cossairt, University of Washington*
Co-Chair: *Tomokazu Shiga, The University of Electro-Communications*

4.1: ***Invited Paper:*** **Role of Phosphorus Oxidation in Controlling the Luminescent Properties of Indium-Phosphide Quantum Dots**
Brandi Cossairt, University of Washington, Seattle, WA, US
4.2: **From the Synthesis of High-Quality InP-Based Quantum Dots to the Development of Efficient QD LEDs**
Armin Wedel, Fraunhofer Institute for Applied Polymer Research, Potsdam, Germany
4.3: **Solution Synthesis of High-Quality Indium-Nitride Quantum Dots**
Junki Nagakubo, ULVAC, Inc., Tsukuba-shi, Ibaraki, Japan
4.4: **High-Stability Green Quantum-Dot Luminescent Microspheres**
Rui Lu, Southern University of Science and Technology, Shenzhen, China

Session 5: Integrated Drivers *(Active-Matrix Devices)*
Tuesday, May 22, 2018 / 11:10 am - 12:30 pm / Room 502A
Chair: *Roger Stewart, Sourland Mountain Associates*
Co-Chair: *Yusin Lin, AU Optronics Corp.*

5.1: ***Invited Paper:*** **Low-Power and Narrow-Border UHD LTPS Notebook Display**
Wen-Ching Tsai, AU Optronics Corp., Hsinchu, Taiwan, ROC
5.2: **Gate-Driver Circuits for an Internal-Compensation-Type OLED Display Using High-Mobility Oxide TFTs**
Dae Hwan Kim, LG Display Co., Ltd., Gyeonggi-do, South Korea
5.3: **OLED Display Device Mounted with a Novel External Compensating Circuit**
Kouhei Toyotaka, Semiconductor Energy Laboratory Co., Ltd., Atsugi-si, Kanagawa, Japan

Session 6: OLED Materials I *(OLEDs)*

Tuesday, May 22, 2018 / 11:10 am - 12:30 pm / Room 502B

Chair: *Denis Kondakov, DuPont*

Co-Chair: *Sven Zimmermann, Novaled GmbH*

6.1: ***Invited Paper/Distinguished Paper:*** **Design Strategies for Materials Showing TADF and Beyond: Toward the Fourth-Generation OLED Mechanism**
Hartmut Yersin, University of Regensburg, Regensburg, Germany

6.2: ***Invited Paper:*** **Toward Ultra-High-Efficiency Low-Rolloff TADF OLEDs**
Andrew Monkman, Durham University, Durham, UK

6.3: ***Distinguished Paper:*** **Highly Efficient Fluorescent Blue Materials and Their Applications for Top-Emission OLEDs**
Tetsuya Masuda, Idemitsu Kosan Co., Ltd., Chiba, Japan

6.4: **Highly Efficient Deep-Blue TADF Emitter**
Dae Hyun Ahn, Kyung Hee University, Seoul, South Korea

Session 7: 3D Holographic and Volumetric Displays *(Display Systems)*

Tuesday, May 22, 2018 / 11:10 am - 12:30 pm / Room 501

Chair: *Jae Hyeung Park, Inha University*

Co-Chair: *Brian Schowengerdt, University of Washington*

7.1: **Computer-Generated Hologram Accelerated by Using Hybrid Iterative Fourier-Transform Algorithm (HIFTA) on a Phase Modulator LCOS**
Shang-Ting Wu, National Chiao-Tung University, Hsinchu, Taiwan, ROC

7.2: **High-Contrast Encoding Method for Amplitude-Only Computer-Generated Hologram**
Jungkwuen An, Samsung Advanced Institute of Technology, Suwon-si, South Korea

7.3: **A Large-Scale Multi-Projection Light-Field Display Based on Multi-View Sampling Calibration**
Lixia Ni, Zhejiang University, Hangzhou, China

Session 8: Image-Artifact Characterization *(Display Measurement)*

Tuesday, May 22, 2018 / 11:10 am - 12:30 pm / Room 503

Chair: *Udo Krüger, TechnoTeam*

Co-Chair: *Stephen Atwood, Eaton Corp.*

8.1: **Standardization of Sparkle Measurement: A Solid Basis**
Michael Becker, Display-Messtechnik & Systeme, Rottenburg am Neckar, Germany

8.2: **Sparkle Characterization of Anti-Glare Layers on Displays with a Grey-Value Histogram Analysis**
Valeriano Ferreras Paz, Robert Bosch GmbH, Renningen, Germany

8.3: **An Evaluation Methodology for Display-Retention Measurement**
Kyuha Choi, Samsung Electronics, Gyeonggi-do, South Korea

Session 9: Emerging Flexible Electronics and Displays *(Emerging Technologies and Applications / Wearable Displays, Sensors, and Devices)*

Tuesday, May 22, 2018 / 11:10 am - 12:30 pm / Room 518

Chair: *Ian Underwood, University of Edinburgh*

Co-Chair: *Bo-Ru Yang, Sun Yat-Sen University*

9.1: ***Invited Paper:*** **A Transparent Light-Emitting Touch-Responsive Device**
Qibing Pei, University of California at Los Angeles, Los Angeles, CA, US

9.2: ***Invited Paper:*** **Stretchable Electronics for Wearable Microvolt Biosignal Monitoring Systems**
Tsuyoshi Sekitani, Osaka University, Osaka, Japan

9.3: **Flexible Mutual-Capacitive Fingerprint Sensor with Hard and Flexible Overlaid Dielectric Layer for Biometrics Application**
Sang-Hee Ko Park, KAIST, Daejeon, South Korea

9.4: **High Performance Organic Thin Film Transistors (OTFTs) for Plastic Sensor Applications**
Mike Banach, FlexEnable Limited, Cambridge, United Kingdom

Session 10: AR/VR II: Light-Field HMDs *(AI and AR and VR / Display Systems)*

Tuesday, May 22, 2018 / 2:00 - 3:20 pm / Room 515A

Chair: *Nikhil Balram, Google, Inc.*

Co-Chair: *Brian Schowengerdt, University of Washington*

10.1: **Towards Varifocal Augmented-Reality Displays Using Deformable Beamsplitter Membranes**
David Dunn, University of North Carolina at Chapel Hill and NVIDIA Research, Chapel Hill, NC, US

10.2: **A Deep Depth of Field Near-to-Eye Light-Field Displays Utilizing LC Lens and Dual-Layer LCDs**
Mali Liu, Zhejiang University, Hangzhou, China

10.3: **Design of a High-Performance Optical See-Through Light-Field Head-Mounted Display**
Hong Hua, University of Arizona, Tucson, AZ, US

10.4: **Stereoscopic / Light-Field Hybrid Head-Mounted Display**
Chun-Ping Wang, National Chiao-Tung University, Hsinchu, Taiwan, ROC

Session 11: Emerging Quantum-Dot Applications *(Quantum Dots and Micro-LEDs / Emerging Technologies and Applications)*

Tuesday, May 22, 2018 / 2:00 - 3:20 pm / Room 515B

Chair: *Adi Abileah, Adi-Displays Consulting LLC*

Co-Chair: *Brandi Cossairt, University of Washington*

11.1: **Bright Organic–Inorganic Perovskite Quantum Dots Fabricated with Simple Ultrasonic Treatment**
Fushan Li, Fuzhou University, Fuzhou, China

11.2: **Solution-Processed High-Performance Photodetector Based on Lead-Sulfide Quantum Dots**
Haodong Tang, Southern University of Science and Technology, Shenzhen, China

11.3: **Ligand Design for Cdse/Zns/Silica-Based Photolithographically Patterned Quantum Dots**
Bingxin Zhao, Southern University of Science and Technology, Shenzhen, China

11.4: **Novel Switching Display Using RGB Quantum Rods for Wide Color Gamut**
Byunggeol Kim, LG Display Co., Ltd., Gyeonggi-do, South Korea

11.5: ***Late-News Paper:*** **Quantum Rods – Smart Choice for Future Display Generations**
Jan Niehaus, Fraunhofer CAN, Hamburg, Germany

Session 12: Oxide TFTs I *(Active-Matrix Devices)*

Tuesday, May 22, 2018 / 2:00 - 3:20 pm / Room 502A

Chair: *James Chang, Apple, Inc.*

Co-Chair: *Kwon-Shik Park, LG Display Co., Ltd.*

12.1: **An Advanced LTPS TFT-LCD Using Top-Gate Oxide TFT Pixels**
Masahiro Tada, Japan Display Inc., Mobara-shi, Chiba, Japan

12.2: **Development of Top-Gate Oxide TFTs for LCDs with Plastic Substrates**
Yohei Yamaguchi, Japan Display Inc., Mobara-shi, Chiba, Japan

12.3: **A 5.5-in. FFS-LCD Driven by Soluble Metal-Oxide with Implementation in the Production Line Through the Use of a BCE-TFT Structure**
Shin-Chuan Chiang, Chunghwa Picture Tubes, Ltd., Bade City, Taoyuan, Taiwan, ROC

12.4: ***Late-News Paper:*** **Reliability Improvement of IGZO and LTPS Hybrid TFTs Array Technology**
Jia-Hong Ye, AU Optronics Corp., Hsinchu, Taiwan, ROC

Session 13: OLED Materials II *(OLEDs)*

Tuesday, May 22, 2018 / 2:00 - 3:20 pm / Room 502B

Chair: *Yifan Zhang, Apple, Inc.*

Co-Chair: *Changwoong Chu, Samsung Display Co., Ltd.*

13.1: ***Invited Paper:*** **Advances in Deep-Blue Emitters for Highly Efficient and Long-Lifetime OLEDs**
Hyoung Yun Oh, Material Science Co., Ltd., Seoul, South Korea

13.2: ***Invited Paper:*** **High-Efficiency Phosphorescence and TADF Organic Light-Emitting Device**
Tien-Lung Chiu, Yuan Ze University, Taoyuan, Taiwan, ROC

13.3: ***Distinguished Paper:*** **Highly Efficient Deep-Blue Fluorescent Dopant for Achieving Low-Power OLED Displays Satisfying BT.2020 Chromaticity**
Yusuke Takita, Semiconductor Energy Laboratory Co., Ltd., Atsugi-shi, Kanagawa, Japan

13.4: **Progress of Highly Efficient Blue TADF Emitter Materials towards Mass Production**
Thomas Baumann, CYNORA GmbH, Bruchsal, Germany

Session 14: Backlight Systems *(Display Systems)*

Tuesday, May 22, 2018 / 2:00 - 3:20 pm / Room 501

Chair: *Masaru Suzuki, Zeon Corporation*

Co-Chair: *Akihiro Tagaya, Tokyo Institute of Technology*

14.1: **Patterned Holey Glass LGP-Based Ultra-Thin 2D Local-Dimming Backlight**
Xiang-Dong Mi, Corning Research & Development Corp., Corning, NY, US

14.2: **Monolithic Glass LGP with Built-In Prism Structure for 1D Dimming Large-Area LCD**
Masanobu Isshiki, Asahi Glass Co., Ltd., Yokohama-shi, Kanagawa, Japan

14.3: **Highly Efficient and Thin Backlight System Using Advanced Light Guide with Multiple Prism Arrays**
Shugo Yagi, Sharp Corp., Tenri, Nara, Japan

14.4: **Optical Characteristics of Flexible Display Light Sources with Arbitrary Curvatures**
K. Käläntär, Global Optical Solutions, Hachi-Oji-shi, Tokyo, Japan

Session 15: Topics in Display Measurement *(Display Measurement)*

Tuesday, May 22, 2018 / 2:00 - 3:20 pm / Room 503

Chair: *Thomas Fiske, Microsoft*

Co-Chair: *Marja Salmimaa, Nokia Technologies*

15.1: **Application of the Optical Measurement Methodologies of IEC and ISO Standards to Reflective e-Paper Displays**
Dirk Hertel, E Ink Corp., Billerica, MA, US

15.2: **Metrology for Field-of-Light Displays**
Abhishek Bichal, FoVI3D, Austin, TX, US

15.3: **Interest of New Ictcp And Jzazbz Color Spaces to Analyze the Color Viewing-Angle Dependence of HDR and WCG Displays**
Pierre Boher, ELDIM, Herouville, Saint Clair, France

15.4: **Quantitative Evaluation of Visual Display Resolution Based on Human Visual Perception**
Kyuha Choi, Samsung Electronics, Suwon-si, South Korea

Session 16: Emerging Technologies and Applications *(Emerging Technologies and Applications)*

Tuesday, May 22, 2018 / 2:00 - 3:20 pm / Room 518

Chair: *Gary Jones, Nanoquantum Corp.*

Co-Chair: *Abhishek Srivastava, Hong Kong University of Science & Technology*

16.1: ***Invited Paper:*** **Holographic Volumetric 3D Displays**
Javid Khan, Holoxica, Ltd., Edinburgh, UK

16.2: ***Distinguished Student Paper:*** **Characterization of Electronic Displays Using Advanced CMOS-Compatible Single-Photon Avalanche-Diodes Image Sensor**
Hanning Mai, The University of Edinburgh, Edinburgh, Scotland, UK

16.3: **Study on Enhancement of Sound Quality by Improvement of Panel Vibration in OLED TVs**
Sungtae Lee, LG Display Co., Ltd., Gyeonggi-do, South Korea

16.4: **Study of Anti-Reflection Thin Polarizer for POLED Display**
Jisu Han, LG Display Co., Ltd., Gyeonggi-do, South Korea

16.5: ***Late-News Paper:*** **Folded Optics with Birefringent Reflective Polarizers**
Timothy Wong, 3M Display Materials & Systems Division, St. Paul, MN, US

Session 17: AR/VR III: Waveguide Optics *(AI and AR & VR / Display Systems)*

Tuesday, May 22, 2018 / 3:40 - 5:00 pm / Room 515A

Chair: *W. Hendrick, Rockwell Collins Optronics*

Co-Chair: *Brian Schowengerdt, University of Washington*

17.1: **A Flat-Panel Holographic Optical-Element System for Holographic AR Display with a Beam Expander**
Pengcheng Zhou, Shanghai Jiao Tong University, Shanghai, China

17.2: **Shearing Bragg Gratings for Slim Mixed Reality**
Adrian Travis, Clare College, Cambridge University, Cambridge, England, UK

17.3: ***Distinguished Paper:*** **A Plastic Holographic Waveguide Combiner for Light-Weight and Highly Transparent AR Glasses**
Takuji Yoshida, SONY Corp., Atsugi-shi, Kanagawa, Japan

17.4: **DigiLens AR HUD Waveguide Technology**
Jonathan Waldern, DigiLens. Inc., Sunnyvale, CA, US

17.5: **High-Efficiency Reflective Polarization Volume Grating for Waveguide-Based AR Displays**
Kun Yin, University of Central Florida, Orlando, FL, US

Session 18: Perovskite Materials and Devices *(Quantum Dots and Micro-LEDs / Emissive Displays)*

Tuesday, May 22, 2018 / 3:40 - 5:00 pm / Room 515B

Chair: *Yajie Dong. University of Central Florida*

Co-Chair: *Poopathy Kathirgamanathan, Brunel University, Harrow, United Kingdom*

18.1: ***Invited Paper:*** **Color-Tunable, Flexible, and Efficient LEDs Composed of Metal-Halide Perovskites**
Barry Rand, Princeton University, Princeton, NJ, US

18.2: **Ultrapure Green LEDs Using Colloidal Quantum Wells of Hybrid Lead-Halide Perovskites**
Chih-Jen Shih, ETH Zurich, Zurich, Switzerland

18.3: **Polarized Emission from Stretch-Aligned Perovskite Nanorods Polymer Composites with High Stability**
Juan He, College of Optics and Photonics, University of Central Florida, Orlando, FL, US

18.4: **Converting Light-Diffusing Polymer Powders into Stable Perovskite-Based Tunable Downconverters**
Caicai Zhang, NanoScience Technology Center, *University of Central Florida, Orlando, FL, US*

Session 19: Oxide TFTs II *(Active-Matrix Devices)*

Tuesday, May 22, 2018 / 3:40 - 5:00 pm / Room 502A

Chair: *Norbert Fruehauf, University of Stuttgart*

Co-Chair: *Arokia Nathan, University of Cambridge*

19.1: ***Invited Paper:*** **Stability of Sputtered Amorphous Tungsten-Doped Indium-Oxide-Based TFTs**
Qun Zhang, Fudan University, Shanghai, China

19.2: ***Distinguished Student Paper:*** **Transparent AMOLED Display Driven by Split Oxide-TFT Backplane**
Jin Jang, Kyung Hee University, Seoul, South Korea

19.3: ***Late-News Paper:*** **Universal Method to Determine the Dynamic NBIS- and PBS-induced Instabilities on Self-aligned Coplanar InGaZnO Thin-film Transistors**

Dae Hwan Kim, Kookmin University, Seoul, South Korea

19.4: ***Late-News Paper:*** **New P-type Amorphous Semiconductor with High-Transparency and High-Mobility of 9 cm2/Vs for Next-Generation Displays**
Junghwan Kim, Tokyo Institute of Technology, Yokohama, Japan

Session 20: OLED Materials III *(OLEDs)*
Tuesday, May 22, 2018 / 3:40 - 5:00 pm / Room 502B
Chair: *Hitoshi Kuma, Idemitsu Kosan Co., Ltd.*
Co-Chair: *Denis Kondakov, DuPont*

20.1: ***Invited Paper:*** **Towards Deep-Blue Materials with Efficient Triplet Harvesting**
Ifor Samuel, University of St. Andrews, St. Andrews, UK

20.2: ***Invited Paper:*** **Degradation Phenomena in Wide-Band-Gap Organic Electroluminescent Materials**
Hany Aziz, University of Waterloo, Waterloo, Ontario, Canada

20.3: **Novel Host–Guest System for Drastic Improvement in the Lifetime of a Deep-Red OLED that Satisfies the Red Chromaticity of the BT.2020 Standard**
Hiromitsu Kido, Semiconductor Energy Laboratory Co., Ltd., Atsugi-shi, Kanagawa, Japan

20.4: **Dipole Orientation Measurement Method by Time-Resolved Photoluminescence**
Jang Hyuk Kwon, Kyung Hee University, Seoul, South Korea

Session 21: 3D Light-Field and Autostereoscopic Displays *(Display Systems)*
Tuesday, May 22, 2018 / 3:40 - 5:00 pm / Room 501
Chair: *Shinichi Uehara, Asahi Glass Co., Ltd.*
Co-Chair: *Brian Berkeley, Highlight Display LLC*

21.1: **Reducing Image-Quality Variation with Motion Parallax for Glassless 3D Screens Using Linear Blending Technology**
Motohiro Makiguchi, NTT Service Evolution Laboratories, Atsugi-si, Kanagawa, Japan

21.2: **Towards Direct-View Accommodative Light-Field Displays**
Robert Ramsey, RealD Me, Boulder, CO, US

21.3: **A Full-HD Super-Multiview Display with Time-Division-Multiplexing Parallax Barrier**
Hideki Kakeya, University of Tsukuba, Tsukuba-shi, Ibaraki, Japan

21.4: **Newly Developed Light-Field Display with Ultra-Wide Viewing Angle and High Resolution**
Takeo Koito, Japan Display Inc., Ebina-shi, Kanagawa, Japan

Session 22: Emerging Medical Applications *(Emerging Technologies and Applications)*
Tuesday, May 22, 2018 / 3:40 - 5:00 pm / Room 518
Chair: *Gary Jones, Nanoquantum Corporation*
Co-Chair: *Timothy Large, Microsoft Corp.*

22.1: ***Invited Paper/Distinguished Paper:*** **Live Delivery of Neurosurgical Operating Theatre Experience in Virtual Reality**
Marja Salmimaa, Nokia Technologies, Tampere, Finland

22.2: **Smart Pharmaceutical Packaging with e-Paper Display for Improved Patient Compliance**
Karlheinz Blankenbach, Pforzheim University, Pforzheim, Germany

22.3: ***Distinguished Student Paper:*** **Flexible Quantum-Dot Light-Emitting Devices for Photomedicine**
Hao Chen, College of Optics and Photonics, University of Central Florida, Orlando, FL, US

22.4: **Wearable Photobiomodulation Patch Using Flexible OLEDs for Human Keratinocyte Cells**
Kyung Cheol Choi, KAIST, Daejeon, South Korea

Session 23: AR/VR IV: Display Electronics *(AI and AR & VR / Display Electronics)*
Wednesday, May 23, 2018 / 9:00 - 10:20 am / Room 515A
Chair: *Mainak Biswas, Google*

23.1: ***Distinguished Student Paper:*** **An AMOLED Pixel Circuit for 1000-ppi and 5.87-in. Mobile Displays with AR and VR Applications**
Oh-Kyong Kwon, Hanyang University, Seoul, South Korea

23.2: **A Novel Low-Power OLED Driving Method Based on Gaze Tracking**
Seung-Woo Lee, Kyung Hee University, Seoul, South Korea

23.3: **Deep Tone-Mapped HDRNET for High-Dynamic-Range Image Restoration**
Suk-Ju Kang, Sogang University, Seoul, South Korea

23.4: **High-Slew-Rate Low-Static-Power Dynamic-Bias Rail-to-Rail Output Buffer for OLED-on-Silicon VR Microdisplay**
Min Zhang, Peking University, Shenzhen, China

Session 24: Flexible Barrier Materials *(e-Paper and Flexible Displays)*
Wednesday, May 23, 2018 / 9:00 - 10:20 am / Room 515B
Chair: *Bo-Ru Yang, Sun Yat-Sen University*
Co-Chair: *Joon Young Yang, LG Display Co., Ltd.*

24.1: ***Invited Paper:*** **Foldable AMOLED with Advanced Gas Barrier by Solution Coating**
Yung-Hui Yeh, Electronic and Optoelectronic System Research Laboratories (EOSL) / Industrial Technology Research Institute (ITRI), Hsinchu, Taiwan, ROC

24.2: **Stress-Minimized and Robust Thin-Film-Encapsulation Based on Mechanically Improved Nanolaminate**
Kyung Cheol Choi, KAIST, Daejeon, South Korea

24.3: **Hot-Melt-Type Face-Sealing Encapsulation for Flexible OLEDs**
Hiroyasu Inoue, ZEON Corp., Takaoka-shi, Toyama, Japan

24.4: **Foldable AMOLED Display Utilizing Novel COE Structure**
Xu Chuanxiang, BOE Corp., Beijing, China

Session 25: Digital Signage *(Emissive Displays / Emerging Technologies and Applications)*

Wednesday, May 23, 2018 / 9:00 - 10:20 am / Room 502A

Chair: *Gary Feather, NanoLumens*

Co-Chair: *Qun Yan, Fuzhou University*

25.1: **Progress in Active Pixel Technology for LED Video Walls**
Douglas Dykaar, DifTek Lasers, Inc., Waterloo, Ontario, Canada

25.2: **On the Support of Light Field and Holographic Video Display Technology**
Jon Karafin, Light Field Lab, Inc. Morgan Hill, CA, US

25.3: ***Invited Paper:*** **HDR Solution: Dynamic Drive on LED Video Screens**
Jorge Perez Bravo, NanoLumens, Inc., Norcross, GA, US

25.4: **Visibility Evaluation of Direct-Bonded Signage Display for Outdoor Use**
Kenta Kasuya, Asahi Glass Co., Yoohamashi, Kanagawa, Japan

Session 26: OLED Devices I *(OLEDs)*

Wednesday, May 23, 2018 / 9:00 - 10:20 am / Room 502B

Chair: *Michael Weaver, UDC*

Co-Chair: *Hitoshi Kuma, Idemitsu Kosan Co., Ltd.*

26.1: ***Invited Paper:*** **High-Efficiency and High-Stability Exciplex-Based OLEDs**
Ken-Tsung Wong, National Taiwan University, Taipei, Taiwan, ROC

26.2: **Extremely High-Efficient OLED Achieving an EQE of Over 40% by Carrier-Injection Layer with Super-Low Refractive Index**
Takeyoshi Watabe, Semiconductor Energy Laboratory Co., Ltd., Atsugi-si, Kanagawa, Japan

26.3: **Difference in Optical and Hole-Injection Properties between Organic Material/Molybdenum Oxide-Composite (OMO_x) Layer and Hole-Injection Layer with Organic Acceptor**
Harue Nakakima, Semiconductor Energy Laboratory Co., Ltd., Atsugi-si, Kanagawa, Japan

26.4: **Computer-Based Optimization of Multistack OLED Devices**
Tobias Neumann, Nanomatch GmbH, Eggenstein-Leopoldshafen, Germany

Session 27: Advances in Automotive Displays *(Automotive/Vehicular Displays and HMI Technologies)*

Wednesday, May 23, 2018 / 9:00 - 10:20 am / Room 501

Chair: *Rashmi Rao, Harman International*

Co-Chair: *Panos Konstantopoulos, SBD Automotive*

27.1: ***Invited Paper:*** **OLCD: Manufacturing Glass-Free Vehicle Displays**
Vincent Barlier, FlexEnable, Ltd., Cambridge, UK

27.2: ***Distinguished Paper:*** **Active Polarizer Dimmable Lens System**
Paul Weindorf, Visteon Corp., Van Buren Twp., MI, US

27.3: **High-Performance FFS-Mode LCD with Photo-Alignment Technology for Vehicular Application**
Masanobu Mizusaki, Display Device Company, Sharp Corp., Tenri, Nara, Japan

27.4: **Material and Design Optimization to Improve Color Performance of Automotive Displays**
Bo Shi, Chengdu BOE Optoelectronics Technology Co., Ltd., Chengdu, China

Session 28: Integrated Gate Drivers *(Display Electronics)*

Wednesday, May 23, 2018 / 9:00 - 10:20 am / Room 503

Chair: *Prof. Hyoungsik Nam, Kyung Hee University*

28.1: **A Robust Bidirectional Gate Driver on Array with Oxide TFTs**
Zhichong Wang, BOE Technology Group Co., Ltd., Ordos, China

28.2: **A Novel OLED Display Panel with Highly Reliable Integrated Gate-Driver Circuit Using IGZO TFTs for Large-Sized UHD TVs**
Hong Jae Shin, LG Display Co., Ltd., Gyeonggi-do, South Korea

28.3: **World's First 120-Hz 85-in. 8K x 4K BCE IGZO GOA VA-LCD**
Ying-Chun Zhao, Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd, Shenzhen, China

28.4: **Design of High-Reliability a-Si:H TFT Gate Driver with Threshold-Voltage Compensation for TFT-LCD Application**
Guang-Ting Zheng, National Chiao-Tung University, Hsinchu, Taiwan, ROC

Session 29: New Alignment Technologies I *(Liquid-Crystal Technology)*

Wednesday, May 23, 2018 / 9:00 - 10:20 am / Room 518

Chair: *Hoi-Sing Kwok, Hong Kong University of Science & Technology*

Co-Chair: *Jenn Jia Su, AU Optronics Corp.*

29.1: ***Invited Paper:*** **Novel Alignment Layer, Insulation Materials, and Color Photolithography Materials for Advanced LCD**
Hiroaki Tokuhisa, JSR Corp., Yokkaichi-si, Mie, Japan

29.2: **Advanced Photo-Alignment Material for both Photo- and Rubbing-Alignment Methods**
Hyun Jin Park, LG Display Co., Ltd., Gyeonggi-do, South Korea

29.3: **Highly Versatile and Stable Photoalignment Process for AMLCDs**
Colin McGinty, Liquid Crystal Institute, Kent State University, Kent, OH, US

29.4: **PI-Less IPS/FFS LCDs Utilizing Reactive LC with Cinnamate Moiety**
Myong-Hoon Lee, Chonbuk National University, Jeonju-si, Jeonbuk, South Korea

Session 30: Input Technologies for AR/VR *(AI and AR & VR)*

Wednesday, May 23, 2018 / 10:40 am - 12:00 pm / Room 515A

Chair: *William Cummings, Microsoft*

30.1: **Cyclopean-Eye-Based Binocular Orientation in Virtual Reality**
Zhenping Xia, Suzhou University of Science and Technology, Suzhou, China

30.2: **Implementation of a Real-Time Eye-Gaze-Tracking Solution for ASIC Based on a VR Display**
Quan Yang, BOE Technology Group Co., Ltd., Beijing, China

30.3: **Ultra-High-Speed 6DOF SLAM Using Optical Compression**
Klony Lieberman, Sixdof.Space, Jerusalem, Israel

30.4: **Image Enhancement for Augmented Reality by Simultaneous Localization and Mapping Using Advanced Features and Techniques**
Bing Yu, Shanghai Jiao Tong University, Shanghai, China

Session 31: Flexible Materials and Substrates *(e-Paper and Flexible Displays)*

Wednesday, May 23, 2018 / 10:40 - 12:00 pm / Room 515B

Chair: *Kyung Cheol Choi, KAIST*

Co-Chair: *Simon Kang, Apple, Inc.*

31.1: ***Invited Paper:*** **Green Printing Technology for Manufacturing Functional Devices**
Yanlin Song, Chinese Academy of Sciences, Beijing, China

31.2: ***Invited Paper:*** **Silver Nanowire Transparent Conductive Films for Flexible/Foldable Devices**
Haixia Dai, Cambrios Advanced Materials Corp., Sunnyvale, CA, US

31.3: **Activegrid: A Flexible Solution-Processed Transparent Conductor with Excellent Optical Properties**
Ajay Virkar, C3Nano, Hayward, CA, US

31.4: **Ultra-Thin Chemically Strengthened Cover Glass with High Impact Failure Resistance for Foldable Devices**
Yusuke Fujiwara, Asahi Glass Co., Ltd., Chiyoda-ku, Tokyo, Japan

Session 32: Emissive Display Materials *(Emissive Displays)*

Wednesday, May 23, 2018 / 10:40 am - 12:00 pm / Room 502A

Chair: *Jonathan Steckel, Apple, Inc.*

Co-Chair: *Larry Weber, Consultant*

32.1: **On-Chip Red Quantum Dots in White LEDs for General Illumination**
Daniel Estrada, Lumileds, LLC, San Jose, CA, US

32.2: **WITHDRAWN**

32.3: ***Invited Paper:*** **GE RadiantRed Technology & TriGain Phosphors for Wide-Color-Gamut Displays and Lighting**
Jim Murphy, GE, Boston, MA, US

32.4: **Potential Red Phosphors for LEDs: Replacing Eu^{3+} Activators in Li $Eu(Wo_4)^2$ with Al^{3+} Cations**
Terry Ireland, Brunel University London, Uxbridge, UK

Session 33: OLED Devices II *(OLEDs)*

Wednesday, May 23, 2018 / 10:40 am - 12:00 pm / Room 502B

Chair: *Jang-Hyuk Kwon, Kyung Hee University*

Co-Chair: *Hitoshi Kuma, Idemitsu Kosan Co., Ltd.*

33.1: ***Invited Paper:*** **Exploring the Formation and Growth of Organic Semiconductors with mm-Scale Grains**
Barry Rand, Princeton University, Princeton, NJ, US

33.2: **Flexible OLED Panels with Pixilated Graphene Anode**
Nam Sung Cho, ETRI, Daejeon, South Korea

33.3: **Systematic Optimization for Achieving Indistinguishable Color Shift of RGB OLED Displays**
Guanjun Tan, University of Central Florida, Orlando, FL, US

33.4: **Enhanced Adhesion and Stability of a Silver-Nanowire Transparent Electrode for OLEDs by Compositing with a Biocompatible Polymer without High-Temperature Treatment**
Gufeng He, Shanghai Jiao Tong University, Shanghai, China

Session 34: Automotive Display Systems and Functional Safety *(Automotive/Vehicular Displays and HMI Technologies)*

Wednesday, May 23, 2018 / 10:40 am - 12:00 pm / Room 501
Chair: *Philippe Coni, THALES Avionics*
Co-Chair: *Karlheinz Blankenbach, Pforzheim University*

34.1: ***Invited Paper:*** **Performance Optimization for Display Solutions by Smart System Integration**
Kai Hohmann, Continental Automotive GmbH, Babenhausen, Germany

34.2: **The Benefit of Extensive Testing for the Development of Automotive and Head-Up Display Components**
Sebastian Koster, Xtronic GmbH, Boblingen, Germany

Session 35: OLED Driving and Compensation *(Display Electronics)*

Wednesday, May 23, 2018 / 10:40 am - 12:00 pm / Room 503
Chair: *Seung Woo Lee, Kyung Hee University*
Co-Chair: *Chaohao Wang, Apple, Inc.*

35.1: **Strategy for Ultra-High-Luminance AMOLED Display**
Shingo Eguchi, Semiconductor Energy Laboratory Co., Ltd., Atsugi-si, Kanagawa, Japan

35.2: **40x-Current-Variation Reduction Enabled by an External V_t Compensation Scheme for AMOLED Displays Using a 3T2C Pixel Circuit with Dual-Gate TFTs**
Lynn Verschueren, ESAT, KU, Leuven, Belgium

35.3: ***Invited Paper:*** **An Electro-Optical OLED Model for Prediction and Compensation of AMOLED Aging Artifacts**
Xingtong Jiang, Saarland University, Saarbracken, Germany

35.4: **A Compensation Algorithm for Degradation in AMOLED Displays**
Jaeshin Kim, Samsung Display Co., Ltd., Gyeonggi-do, South Korea

Session 36: New Alignment Technologies II *(Liquid-Crystal Technology)*

Wednesday, May 23, 2018 / 10:40 am - 12:00 pm / Room 518
Chair: *Michael Wittek, Merck KGaA*
Co-Chair: *Philip Bos, Kent State University*

36.1: ***Invited Paper:*** **The Evolution of the Vertically Aligned LCD**
Edward Plummer, Merck KGaA, Darmstadt, Germany

36.2: ***Invited Paper:*** **Self-Alignment of Liquid Crystal for Multi-Domain LCD**
Song Lan, Shenzhen China Star Optoelectronics Technology Co., Ltd., Shenzhen, China

36.3: ***Invited Paper:*** **Homogeneous Self-Alignment Technology without Forming Conventional Alignment Layers**
Masanobu Mizusaki, Display Device Company, Sharp Corp., Tenri, Nara, Japan

36.4: **The Correlation of Liquid-Crystal Alignment and the Amount of Photo-Fragmented Surface Morphology**
Dong Myung Shin, Hongik University, Seoul, South Korea

Session 37: Artificial Intelligence and Machine Learning (AI/ML) *(AI and AR & VR)*

Wednesday, May 23, 2018 / 3:30 - 4:50 pm / Room 515A
Chair: *William Cummings, Microsoft*
Co-Chair: *Achin Bhowmik, Starkey Hearing Technology*

37.1: ***Invited Paper:*** **3D Computer Vision Based on Machine Learning with Deep Neural Networks: A Review**
Kailas Vodrahalli, University of California at Berkeley, Berkeley, CA, US

37.2: ***Invited Paper:*** **Enhancing Speech in Noisy and Reverberant Environments Using Deep Learning Techniques**
Tao Zhang, Starkey Hearing Technologies, Eden Prairie, MN, USA

37.3: ***Invited Paper:*** **Deep-Learning based Approaches to Visual-Inertial Odometry for Autonomous Tracking Applications**
Harsh Menon, Nod Labs, Mountain View, CA, USA

37.4: ***Invited Paper:*** **Intelligent Virtual-Reality Head-Mounted Displays with Brain Monitoring and Visual Function Assessment**
John K. Zao, National Chiao Tung University, Hsinchu, Taiwan, ROC

Session 38: Stretchable and Printable Electronics/Displays *(Wearable Displays, Sensors and Devices)*

Wednesday, May 23, 2018 / 3:30 - 4:50 pm / Room 515B
Chair: *Bo-Ru Yang, Sun Yat-Sen University*
Co-Chair: *Zheng Cui. Chinese Academy of Sciences*

38.1: ***Invited Paper:*** **Stretchable Oxide TFTs with PI and PDMS Substrate**
Jin Jang, Kyung Hee University, Seoul, South Korea

38.2: ***Invited Paper:*** **Strain-Engineered Platform Technology for Stretchable Hybrid Electronics**
Yongtaek Hong, Seoul National University, Seoul, South Korea

38.3: ***Invited Paper:*** **Recent Technology Progress on Ink-Jet-Printed Display**
Jingyao Song, Guangdong Juhua Printing Display Technology, Guangzhou, China

38.4: **Clothing-Shaped OLEDs for Wearable Displays**
Kyung Cheol Choi, KAIST, Daejeon, South Korea

Session 39: Novel TFT Applications *(Active-Matrix Devices)*

Wednesday, May 23, 2018 / 3:30 - 4:50 pm / Room 502A
Chair: *Mike Hack, Universal Display Corp.*

Co-Chair: *Man Wong, Hong Kong University of Science & Technology*

39.1: ***Invited Paper:*** **Hybrid Nanomanufacturing of Heterostructured Nanodevices for Self-Powered Smart Skin and User Interface**
Wenzhuo Wu, Purdue University, West Lafayette, IN, US

39.2: **Highly Sensitive a-Si:H PIN Photodiode Gated LTPS TFT for Optical In-Display Fingerprint Identification**
Xianda Zhou, Sun Yat-Sen University, Guangzhou, China

39.3: **Printed Organic Photodetector Arrays and Their Use in Palmprint Scanners**
Hylke Akkerman, TNO / Holst Centre, Eindhoven, Netherlands

39.4: **TFT Integrated Microelectromechanical Shutter for Display Application**
Sheikh Abdullah Al Nusayer, University of Stuttgart, Stuttgart, Germany

Session 40: OLED AR/VR *(OLEDs)*

Wednesday, May 23, 2018 / 3:30 - 4:50 pm / Room 502B

Chair: *Tariq Ali, EMagin Corp.*

Co-Chair: *Jang Hyuk Kwon, Kyung Hee University*

40.1: ***Invited Paper:*** **Next-Generation Virtual-Reality Displays: Challenges and Opportunities**
Kunjal Parikh, Intel Corp., Santa Clara, CA, US

40.2: ***Invited Paper:*** **Microdisplays for Augmented and Virtual Reality**
Gunther Haas, Microoled S.A.S., Grenoble, France

40.3: **Gate-Tunable Electron Injection-Based OLEDs for VR Applications**
Huaping Li, Atom Optoelectronics, Inglewood, CA, US

40.4: **Effect of Evaporation Stagnation on the Performance of OLED Devices**
Xiaohu Li, BOE Technology Group Co., Ltd., Beijing, China

40.5: ***Invited Paper:*** **High Frame-Rate 1" WUXGA OLED Microdisplay and Advanced Free-Form Optics for Ultra-Compact VR Headsets**
Uwe Vogel, Fraunhofer FEP, Dresden, Germany

Session 41: Quantum-Dot LCDs *(Quantum Dots and Micro-LEDs / Automotive/Vehicular Displays and HMI Technologies / Emissive Displays / Liquid-Crystal Technology)*

Wednesday, May 23, 2018 / 3:30 - 4:50 pm / Room 501

Chair: *John Van Derlofske, 3M*

Co-Chair: *Seth Coe-Sullivan, Luminit, LLC*

41.1: ***Invited Paper:*** **QLED Auto: Quantum-Dot-Based Wide-Color-Gamut TFT-LCD for Automotive Applications**
Rashmi Rao, Harman International, Santa Clara, CA, US

41.2: **Novel Thinnest Free-Form QD Film with Honeycomb Structure**
Hirofumi Toyama, FUJIFILM Corp., Minamiashigara-shi, Kanagawa, Japan

41.3: **Quantum-Dot-Photoresist Solution for Patterning of High-Resolution Quantum-Dot Color Filter via a Conventional Photolithography Processes**
Ray-Kuang Chiang, Far East University, Tainan, Taiwan, ROC

41.4: **Perovskite Quantum Dots: Bringing LCD Technology to the Next Level**
Norman Luechinger, Avantama Ltd., Staefa, Switzerland

41.5: ***Invited Paper:*** **Quantum Dot Conversion Layers Through Inkjet Printing**
Ernest Lee, Nanosys, Milpitas, CA, US

Session 42: Novel Display Circuits *(Display Electronics)*

Wednesday, May 23, 2018 / 3:30 - 4:50 pm / Room 503

Chair: *Richard McCartney, Pixel Scientific, Inc.*

42.1: **A Promising Strategy of Low-Power Circuit Design for an Integrated Display Driver Using Charge-Trap Memory and Oxide TFTs**
Sung-Min Yoon, Kyung Hee University, Yongin-si, Gyeonggi-do, South Korea

42.2: ***Invited Paper:*** **OptRod: A Shape-Free and Multi-Functional Display System Operated by Projected Images**
Yuichi Itoh, Osaka University, Suita, Osaka, Japan

42.3: ***Invited Paper:*** **A 4-Gbps/Lane Column Driver for 8K UHD 120-Hz Display Larger than 85 in.**
Hyun-Wook Lim, Samsung Electronics, Hwasung, South Korea

42.4: **A Novel De-Mux and 120-Hz Driving Technology for High-Resolution OLED Displays**
Soondong Kim, Samsung Display Co., Ltd., Gyeonggi-do, South Korea

Session 43: Smart Windows with LC Technology *(Liquid-Crystal Technology)*

Wednesday, May 23, 2018 / 3:30 - 4:50 pm / Room 518

Chair: *Xiao-Yang Huang, Ebulent Technologies Corp.*

Co-Chair: *Gang Xu, Huawei*

43.1: **Tri-Stable Cholesteric Liquid-Crystal Smart Window and Reflective Transparent Display**
Tsung-Hsien Lin, National Sun Yat-Sen University, Taiwan, ROC

43.2: **Structured PDLCs for Controlling LCD Viewing-Angle**
Takahiro Ishinabe, Tohoku University, Sendai, Japan

43.3: ***Distinguished Paper:*** **Brilliant Cosmetic Film for Ambient Displays with Cholesteric Liquid Crystal**

Makoto Ishiguro, FUJIFILM Corp., Minamiashigara-shi, Kanagawa, Japan

43.4: **Self-Shading with Optically and Thermally Switchable Liquid Crystals**
Tae-Hoon Yoon, Pusan National University, Busan, South Korea

Session 44: Fast-Switching LCDs for AR/VR I *(AI and AR & VR / Liquid-Crystal Technology)*

Thursday, May 24, 2018 / 9:00 - 10:20 am / Room 515A

Chair: *Michael Wand, LC Vision, LLC*

Co-Chair: *Jian Gang Lu, Shanghai Jiao Tong University*

44.1: ***Distinguished Student Paper:*** **Motion-Blur-Free LCD for High-Resolution Virtual-Reality Displays**
Fangwang Gou, University of Central Florida, Orlando, FL, US

44.2: **Fast-Response-Time AH-IPS Mode for High-Resolution Application**
Soo In Jo, LG Display Co., Ltd., Gyeonggi-do, South Korea

44.3: **Large-Area Multi-Layer Liquid-Crystal Phase Modulators Enabled By Two-Photon Polymerization**
Daniel Franklin, College of Optics and Photonics, University of Central Florida, Orlando, FL, US

44.4: **New Liquid Crystals Enabling High-Frame-Rate LCoS for Augmented-Reality Displays**
Yuge Huang, College of Optics and Photonics, University of Central Florida, Orlando, FL, US

Session 45: Micro-LED Epitaxial Semiconductor Materials & Manufacturing *(Quantum Dots and Micro-LEDs / Emissive Displays)*

Thursday, May 24, 2018 / 9:00 - 10:20 am / Room 515B

Chair: *Zhaojun Liu, Southern University of Science and Technology*

Co-Chair: *Ion Bita, Apple, Inc.*

45.1: **Status and Prospects of Micro-LED Displays**
Eric Virey, Yole Developpement, Portland, OR, US

45.2: ***Invited Paper:*** **Micro-LED Displays: Key Manufacturing Challenges and Solutions**
Ajit Paranjpe, Veeco Instruments, Inc, Somerset, NJ, US

45.3: ***Invited Paper:*** **Enabling the Next Era of Display Technologies by Micro-LED MOCVD Processing**
Arthur Beckers, Aixtron SE, Herzgenrath, Germany

45.4: **Hybrid Integration of RGB Inorganic LEDs Using Adhesive Bonding and Selective-Area Growth**
Dong-Seon Lee, Gwangju Institute of Science and Technology, Gwangju, South Korea

Session 46: Ultra-High Resolution I *(Active-Matrix Devices)*

Thursday, May 24, 2018 / 9:00 - 10:20 am / Room 502A

Chair: *Hyun Jae Kim, Yonsei University*

Co-Chair: *Kalluri Sarma, Honeywell, Inc.*

46.1: ***Invited Paper:*** **Large-Area Ultra-High-Density 5.36-in. 10K 2250-ppi Display**
Hyun Sup Lee, Samsung Display Co., Ltd., Gyeonggi-do, South Korea

46.2: ***Invited Paper:*** **Ultimate-Resolution Active-Matrix Display with Oxide-TFT Backplanes for Electronic Holographic Display**
Chi-Sun Hwang, ETRI, Daejeon, South Korea

46.3: ***Distinguished Paper:*** **4032-ppi High-Resolution OLED Microdisplay**
Takuma Fujii, Sony Semiconductor Solutions Corp., Atsugi-shi, Kanagawa, Japan

46.4: **513-ppi Hybrid Display with Stacked Transistors**
Hidenori Mori, Semiconductor Energy Laboratory Co., Ltd., Tochigi-shi, Tochigi, Japan

Session 47: OLED Processes *(OLEDs)*

Thursday, May 24, 2018 / 9:00 - 10:20 am / Room 502B

Chair: *Sven Zimmermann, Novaled GmbH*

Co-Chair: *Yasunori Kijima, Huawei Technologies Co., Ltd.*

47.1: ***Invited Paper:*** **Important Technologies of Ink-Jet Printer and VF Unit for OLED Display Fabrication**
Teruyuki Hayashi, Tokyo Electron Kyushu, Ltd., Nirasaki City, Japan

47.2: ***Invited Paper:*** **Highly Transparent AMOLED for Augmented-Reality Applications**
Peng Yu Chen, AU Optronics Corp., Hsinchu, Taiwan, ROC

47.3: **High-Efficiency and High-ppi AMOLED with Cavity-Solution Hole-Injection Layer by Ink-Jet Printing**
Meng-Ting Lee, AU OptronicS Corp., Hsinchu, Taiwan, ROC

47.4: **Effects of Fine-Metal-Mask Wrinkle on OLED Patterning Defects**
Haibin Zhu, BOE Technology Group Co., Ltd., Beijing, China

Session 48: e-Paper and Reflective Displays *(e-Paper and Flexible Displays)*

Thursday, May 24, 2018 / 9:00 - 10:20 am / Room 501

Chair: *Makoto Omodani, Tokai University*

Co-Chair: *Jennifer Lin, AU Optronics Corp.*

48.1: ***Invited Paper:*** **Dramatic Advances in the Application of Electrophoretic Displays**

Michael McCreary, E Ink Corp., Billerica, MA, US

48.2: **Electronic Paper 2.0: Frustrated eTIR as a Path to Color and Video**
Bob Fleming, CLEARink Displays, Fremont, CA, US

48.3: ***Distinguished Student Paper:*** **Ambient-Light-Adaptive Image-Quality Enhancement for Full-Color e-Paper Displays Using a Saturation-Based Tone-Mapping Method**
Yi-Wen Chen, National Chiao-Tung University, Hsinchu, Taiwan, ROC

48.4: **Colorful Active-Matrix Reflective Display by Using Proprietary Surface-Anchoring Liquid Crystal and High-Performance Front-Light Module**
Chien-Hua Chen, Chunghwa Picture Tubes, Ltd., Taoyuan, Taiwan, ROC

Session 49: Image Processing *(Display Electronics)*

Thursday, May 24, 2018 / 9:00 - 10:20 am / Room 503

Chair: *Wei Yao, Apple, Inc.*

Co-Chair: *Paul Oh, LG Display Co., Ltd.*

49.1: **Visual Quality Improvement of Scattering-Mode Reflective Display Utilizing Color-Purifying and Sharpening Algorithms**
Chia-Cheng Liao, Chunghwa Picture Tubes, Ltd., Bade City, Taoyuan, Taiwan, ROC

49.2: **Hierarchical Logo Detection and Image Processing Algorithm for Preventing OLED Image Sticking**
Euiyeol Oh, LG Display Co., Ltd., Paju-si, Gyeonggi-do, CO South Korea

49.3: **PMNet: Passive Matrix Electrochromic Display Driving Scheme using Neural Network**
Hyoungsik Nam, Kyung Hee University, Seoul, South Korea

49.4: **A Low-Power Reflective LCD System with Adaptive Compression Algorithm of Grey Scale**
Long Feng, Beijing BOE Display Technology Co., Ltd., Beijing, China

Session 50: TFT Manufacturing Trends *(Display Manufacturing)*

Thursday, May 24, 2018 / 9:00 - 10:20 am / Room 518

Chair: *Joerg Winkler, Plansee SE*

Co-Chair: *Andriy Romanyuk, Glas Troesch AG*

50.1: ***Invited Paper:*** **Integration of Key Components into the Panel: Adding Value and Increasing Performance of FPDs**
Charles Annis, IHS Markit, Tokyo, Japan

50.2: **Accelerating Advanced Display Fab Yield Ramp with Innovative Autonomous Inline Electron-Beam Review System**
SoonShin Choi, Tianma Micro-Electronics Co., Ltd., Wuhan, China

50.3: **Formation of Source-and-Drain Regions in Top-Gate Self-Aligned Oxide Semiconductor FET**
Kenichi Okazaki, Semiconductor Energy Laboratory Co., Ltd., Tochigi-shi, Tochigi, Japan

50.4: **Novel Large-Sized Process for Organic TFT Fabrication**
Chia-Hung Tsai, AU Optronics Corp., Hsinchu, Taiwan, ROC

Session 51: Fast-Switching LCDs for AR/VR II *(AI and AR & VR / Liquid-Crystal Technology)*

Thursday, May 24, 2018 / 10:40 am - 12:00 pm / Room 515A

Chair: *Koichi Miyachi, JSR Corp.*

Co-Chair: *Shui Chih Lien, CSOT*

51.1: **Optimal Fast-Response LCD for High-Definition Virtual-Reality Head-Mounted Display**
Toshiharu Matsushima, Japan Display Inc., Mobara, Japan

51.2: **Development of Super-Fast-Response LCD for VR-HMD**
Takashi Katayama, Display Device Company, Sharp Corp., Tenri, Nara, Japan

51.3: **High-Birefringence Liquid Crystal for Phase-Only Spatial Light Modulators**
Ran Chen, Shaanxi Normal University, Xi'an, China

51.4: **Ultra-Fast Moving-Picture-Response-Time LCD for Virtual-Reality Application**
Chang-Hung Li, AU Optronics Corp., Hsinchu, Taiwan, ROC

51.5: ***Late-News Paper:*** **Fast Motion Picture Response Color Filter LCOS for Wearable Applications**
Yuet Wing LI, Himax Display, Inc., Tainan, Taiwan, ROC

Session 52: Micro-LED Device Processing and Hetero-Integration *(Quantum Dots and Micro-LEDs / Emissive Displays)*

Thursday, May 24, 2018 / 10:40 am - 12:00 pm / Room 515B

Chair: *Ion Bita, Apple, Inc.*

Co-Chair: *Qun Yan, Fuzhou University*

52.1: ***Invited Paper:*** **Nanostructures on Silicon to Solve the Active Display Paradigms**
Philippe Gilet, ALEDIA, Grenoble, France

52.2: ***Invited Paper:*** **Integration of III-V Micro-LEDs with Si TFTs for Microdisplay Applications**
Vincent Lee, Lumiode, Inc., New York, NY, US

52.3: ***Invited Paper:*** **Combining Engineered EPI Growth Substrate Materials with Novel Test and Mass-Transfer Equipment to Enable Micro-LED Mass-Production**
Francois Henley, QMAT, Inc., Santa Clara, CA, US

52.4: **Laser-Enabled Extremely High-Rate Technology for Micro-LED Assembly**

Val Marinov, Uniqarta, Inc., Fargo, ND, US

52.5: ***Late-News Paper:*** **The Future of MicroLED Displays using Next-Generation Technologies**
Keith Strickland, Plessey Semiconductors, Ltd., Plymouth, United Kingdom

Session 53: Ultra-High Resolution II *(Active-Matrix Devices)*
Thursday, May 24, 2018 / 10:40 am - 12:00 pm / Room 502A
Chair: *Junho Song, Korea University*
Co-Chair: *Takashi Nakamura, Japan Display Inc.*

53.1: ***Distinguished Paper:*** **A Novel Low-Power Gate-Driver Architecture for Large 8K 120-Hz LCD Employing IGZO Technology**
Yasuaki Iwase, Display Device Company, Sharp Corp., Kameyama, Mie, Japan

53.2: **Development of Cu BCE-Structure IGZO TFT for High-ppi 85-in. 8K x 4K 120-Hz GOA LCD**
Shi-Min Ge, Shenzhen China Star Optoelectronics Technology Co., Ltd., Shenzhen, China

53.3: ***Distinguished Paper:*** **IGZO-TFT Technology for a Large-Screen 8K Display**
Yoshihito Hara, Sharp Corp., Display Device Company, Kameyama, Mie, Japan

Session 54: Flexible OLED Displays *(OLEDs / e-Paper and Flexible Displays)*
Thursday, May 24, 2018 / 10:40 am - 12:00 pm / Room 502B
Chair: *Kevin Gahagan, Corning Incorporated*
Co-Chair: *Hyun Woo Koo, Samsung Display Co., Ltd.*

54.1: ***Distinguished Paper:*** **World's First 77-in. Transparent Flexible OLED Display**
Chan Il Park, LG Display Co., Ltd., Gyeonggi-do, South Korea

54.2: **Flexible a-IGZO TFT for Large-Sized OLED TV**
Won Beom Yoo, LG Display Co., Ltd., Gyeonggi-do, South Korea

54.3: ***Distinguished Paper:*** **High-Temperature Thin-Film Barriers for Foldable AMOLED Displays**
Hylke Akkerman, TNO / Holst Centre, Eindhoven, The Netherlands

Session 55: Automotive Head-Up Displays *(Automotive/Vehicular Displays and HMI Technologies / AI and AR & VR)*
Thursday, May 24, 2018 / 10:40 am - 12:00 pm / Room 501
Chair: *Rashmi Rao, Harman International*
Co-Chair: *Haruhiko Okumura, Toshiba Corp.*

55.1: ***Invited Paper:*** **Superiority of Monocular Augmented Reality When Continuous Viewing is Required**
Akihiko Kitamura, Osaka University, Suita, Japan

55.2: ***Invited Paper:*** **Volume-Optimized and Mirror-Less Holographic Waveguide Augmented-Reality Head-Up Display**
Bjoern Richter, Continental Automotive GmbH, San Jose, CA, US

55.3: **Holographic Grating to Improve the Efficiency of Windshield HUDs**
Philippe Coni, THALES Avionics SAS, Merignac, France

Session 56: Novel Display Technologies *(Display Systems)*
Thursday, May 24, 2018 / 10:40 am - 12:00 pm / Room 503
Chair: *K. Käläntär, Global Optical Solutions*
Co-Chair: *Shinichi Uehara, Asahi Glass Co., Ltd.*

56.1: ***Invited Paper:*** **Volumetric Displays Using Holographic Laser Drawing**
Yoshio Hayasaki, Utsunomiya University, Utsunomiya, Japan

56.2: **Seamless Scalable Large Format Display**
Roger Hajjar, Prysm, Inc., San Jose, CA, US

56.3: **New Process to Fabricate Hybrid Display**
Shingo Eguchi, Semiconductor Energy Laboratory Co., Ltd., Atsugi-si, Kanagawa, Japan

56.4: **Key Technologies for Assembling Kawara-Type Multidisplays**
Daiki Nakamura, Semiconductor Energy Laboratory Co., Ltd., Atsugi-si, Kanagawa, Japan

Session 57: Advanced TFT Manufacturing Processes *(Display Manufacturing)*
Thursday, May 24, 2018 / 10:40 am - 12:00 pm / Room 518
Chair: *Chi Woo Kim, Seoul National University*
Co-Chair: *Yukio Endo, Asahi Glass Co., Ltd.*

57.1: ***Invited Paper:*** **Application of Rapid-Thermal-Annealing Process to Display Technology**
Sang-Hee Ko Park, KAIST, Daejeon, South Korea

57.2: **Scalable Crystallization of a-Si Film on a Glass Substrate by Using a Blue-Diode Laser**
Jin Jang, Kyung Hee University, Seoul, South Korea

57.3: **Folded-Pixel-Circuit Design in Grain-Boundary-Free (100) Oriented LTPS Stripes Fabricated by Selective CW-Laser Lateral Crystallization**
Nobuo Sasaki, Sasaki Consulting, Kawasaki, Japan

57.4: **Experimental Demonstration of Quasi-CW Spot-Beam Crystallization (QCW SBC) of Si Films Using an Ultra-High-Frequency UV Fiber Laser**
Ruobing Song, Columbia University, New York, NY, US

57.5: ***Invited Paper:*** **Excimer Laser Annealing and Spot-Beam Crystallization of Si Films for Advanced Displays**
James Im, Columbia University, New York, NY, US

Session 58: High-Resolution LCDs for AR/VR *(AI and AR & VR / Liquid-Crystal Technology)*

Thursday, May 24, 2018 / 1:30 - 2:50 pm / Room 515A

Chair: *Philip Chen, National Chiao Tung University*

Co-Chair: *Linghui Rao, Microsoft*

58.1: ***Invited Paper:*** **High-Resolution IPS-LCDs Fabricated with Transparent Polyimide Substrates**
Shinichiro Oka, Japan Display Inc., Mobara-shi, Chiba, Japan

58.2: ***Invited Paper:*** **High-Performance Displays for Wearable and HUD Applications**
Edmund Passon, Compound Photonics, Chandler, AZ, US

58.3: **Sub-kHz 4000-ppi LCoS Phase Modulator for Holographic Displays**
Jhou-Pu Yang, National Chiao-Tung University, Hsinchu, Taiwan, ROC

58.4: ***Distinguished Student Paper:*** **Active-Matrix Field-Sequential-Color Electrically Suppressed Helix Ferroelectric Liquid Crystal for High-Resolution Displays**
Liangyu Shi, The Hong Kong University of Science and Technology, Kowloon, Hong Kong

Session 59: Micro-LED Microdisplays *(Quantum Dots and Micro-LEDs / Emissive Displays)*

Thursday, May 24, 2018 / 1:30 - 2:50 pm / Room 515B

Chair: *Prof. Zhaojun Liu, Southern University of Science and Technology*

Co-Chair: *Ioannis Kymissis, Columbia University*

59.1: ***Invited Paper:*** **A Full-Color Micro-LED Display by Using a Lithographic-Fabricated Photoresist Mold**
Chih-Hao Lin, National Chiao Tung University, Hsinchu, Taiwan, ROC

59.2: ***Invited Paper:*** **Ultra-Fine-Pitch Thin-Film Micro-LED Display for Indoor Applications**
Chien-Chung Lin, ITRI, Hsinchu, Taiwan, ROC

59.3: ***Distinguished Paper:*** **Wafer-Scale Hybrid Monolithic Integration of Si-Based IC and III-V Epilayers: A Mass Manufacturable Approach for Active-Matrix Micro-LED Displays**
Lei Zhang, Hong Kong Beida Jade Bird Display, Ltd., Shanghai, China

59.4: ***Invited Paper:*** **Electro-Optical Size-Dependence Investigation in GaN Micro-LED Devices**
Anis Daami, CEA-LETI, Grenoble, France

Session 60: Flexible TFTs *(Active-Matrix Devices / e-Paper and Flexible Displays)*

Thursday, May 24, 2018 / 1:30 - 2:50 pm / Room 502A

Chair: *Jin Jang, Kyung Hee University*

Co-Chair: *Hsing-Hung Hsieh, HP International Pte., Ltd.*

60.1: ***Invited Paper:*** **Electrolyte-Gated Flexible Graphene Schottky Barrier Transistors**
Jeong Ho Cho, Sungkyunkwan University, Suwon, South Korea

60.2: **Direct Patterning of Fine Electrodes by Wettability Control of a Novel Photocrosslinkable Polymer Insulator for Solution-Based OTFTs**
Shinya Oku, Tosoh Corp., Yokkaichi-si, Mie, Japan

60.3: **High-Performance MoS_2 TFTs for Flexible OLED Displays**
Sung-Yool Choi, KAIST, Yuseong-gu, Daejeon, South Korea

60.4: **Mechanically Robust High-Performance Flexible Oxide TFTs with Imbedded Buried CNT Electrode for Bendable Displays**
Jin Jang, Kyung Hee University, Seoul, South Korea

Session 61: Novel OLEDs *(OLEDs)*

Thursday, May 24, 2018 / 1:30 - 2:50 pm / Room 502B

Chair: *Franky So, North Carolina State University*

Co-Chair: *Yifan Zhang, Apple, Inc.*

61.1: **Form Birefringence-Based Achromatic Quarter-Wave Film for Anti-Reflection OLEDs**
Masanao Goto, JXTG Nippon Oil & Energy Corp., Yokohama-shi, Kanagawa, Japan

61.2: **Weakening Micro-Cavity Effects in White Top-Emitting WOLEDs with Semitransparent Metal Top Electrode**
Zhiqiang Jiao, BOE Technology Group Co., Ltd., Beijing, China

61.3: **Demonstration of Long-Term Stable Emission from Inverted OLED with Imperfect Encapsulation**
Tsubasa Sasaki, NHK Science & Technology Research Laboratories, Setagaya-ku, Tokyo, Japan

Session 62: Automotive HMI Trends for Connected and Autonomous Cars *(Automotive/Vehicular Displays and HMI Technologies)*

Thursday, May 24, 2018 / 1:30 - 2:50 pm / Room 501

Chair: *Philippe Coni, THALES Avionics*
Co-Chair: *Haruhiko Okumura, Toshiba Corp.*

62.1: ***Invited Paper:*** **HMI Concept for the Autonomous Car**
Herve Drezet, Renault Engineering, Guyancourt, France

62.2: **WITHDRAWN**

62.3: ***Invited Paper:*** **Human Interface Design in Transition from Automated Driving to Manual Driving**
Toshihisa Sato, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan

Session 63: Projection: Image Improvement *(Display Systems)*
Thursday, May 24, 2018 / 1:30 - 2:50 pm / Room 503
Chair: *David Eccles, Rockwell Collins*
Co-Chair: *Fujio Okumura, NEC Corp.*

63.1: **Speckle Reduction for Laser Pico-Projector with Dynamic Deformable Mirrors**
Jui-Wen Pan, National Chiao Tung University, Tainan City, Taiwan, ROC

63.2: ***Distinguished Paper:*** **Dependency of Speckle Reduction by Wavelength Diversity on Angular Diversity in Laser Projection System**
Hirotaka Yamada, Ushio, Inc., Hyogo, Japan

63.3: **Real-Time Spatial-Based Projector Resolution Enhancement**
Avery Ma, University of Waterloo, Waterloo, Ontario, Canada

63.4: **Q-View Technology: Approach to Achieving High Resolution and Low Power in Small-Pixel Microdisplay Backplanes**
Craig Waller, Syndiant, Inc., Dallas, TX, US

Session 64: Ink-Jet Printing for Display Manufacturing *(Display Manufacturing)*
Thursday, May 24, 2018 / 1:30 - 2:50 PM / Room 518
Chair: *Toshiaki Arai, JOLED, Inc.*
Co-Chair: *Wei Lung Liau, AU Optronics Corp.*

64.1: ***Invited Paper:*** **Ultra-High-Precision Ink-Jet-Printing Technology for Displays**
Seog Soon Kim, UniJet Co., Ltd., Seongnam, South Korea

64.2: **Fabrication of Auxiliary Electrodes Using Ag Ink-Jet Printing for OLED Lighting**
Sang-Ho Lee, KITECH, Ansan-si, South Korea

64.3: **Photo-Aligned Quantum-Rod Films by Ink-Jet Printing**
Abhishek Srivastava, The Hong Kong University of Science and Technology, Kowloon, Hong Kong

64.4: **Manufacturing and Encapsulation Process of Bottom-Gate Bottom-Contact TFTs with Printed Oxide Semiconductors**
Nesrine Kammoun, University of Stuttgart, Stuttgart, Germany

Session 65: Human Factors in AR/VR System *(AI and AR & VR / Applied Vision)*
Thursday, May 24, 2018 / 3:10 - 4:30 pm / Room 515A
Chair: *Yuning Zhang, Southeast University*
Co-Chair: *Takashi Shibata, Tokyo University of Social Welfarae*

65.1: **Maximum Comfortable Luminance of Head-Mounted Display Under Various Surround Illuminations**
Hyeyoung Ha, Ulsan National Institute of Science and Technology, Ulsan, South Korea

65.2: **Sensitivity to Peripheral Artifacts in VR Display Systems**
David Hoffman, Google, Mountainview, CA, US

65.3: **The Quantization of Cybersickness Level Using EEG and ECG for Virtual-Reality Head-Mounted Displays**
Yi-Tien Lin, AU Optronics Corp., Hsinchu, Taiwan, ROC

65.4: ***Invited Paper:*** **Ergonomic Approaches to Stereoscopic and 360º Images**
Takashi Kawai, Waseda University, Tokyo, Japan

65.5: ***Invited Paper:*** **Resolving the Vergence Accommodation Conflict in VR and AR via Tunable Liquid Crystal Lenses**
Yoav Yadin, Deep Optics, Petach Tikva, Israel

Session 66: Micro-LED System Integration and Applications *(Quantum Dots and Micro-LEDs / Automotive/Vehicular Displays and HMI Technologies / Emissive Displays)*
Thursday, May 24, 2018 / 3:10 - 4:30 pm / Room 515B
Chair: *Ion Bita, Apple, Inc.*
Co-Chair: *Khaled Ahmed, Intel Corp.*

66.1: ***Invited Paper:*** **Design, Fabrication, Transfer Bonding, and Active-Matrix Driving of Full-Color Micro-LEDs for Displays and Beyond**
Zhaojun Liu, Southern University of Science and Technology, Shenzhen, China

66.2: ***Invited Paper:*** **PixeLED Display for Transparent Applications**
Ying-Tsang Liu, PlayNitride, Inc., Hsinchu, Taiwan, ROC

66.3: **Micro-LED Display with Simultaneous Visible-Light Communication Function**
Xianbo Li, The Hong Kong University of Science and Technology, Kowloon, Hong Kong

66.4: **High-Brightness Active-Matrix Micro-LEDs with an LTPS-TFT Backplane**
Jin Jang, Kyung Hee University, Seoul, South Korea

Session 67: Flexible Active-Marix Devices *(Active-Matrix Devices / e-Paper and Flexible Displays)*
Thursday, May 24, 2018 / 3:10 - 4:30 pm / Room 502A
Chair: *Kenichi Takatori, Huawei Technologies Japan K.K.*
Co-Chair: *Xiaojun Guo, Shanghai Jiao Tong University*

67.1: ***Invited Paper:*** **Doped Organic Transistors: Increased Stability and Reproducibility for Active-Matrix Displays**
Bjorn Lussem, Kent State University, Kent, OH, US

67.2: **Requirement of a Polyimide Substrate to Achieve High-Reliability TFTs**
Tomoatsu Kinoshita, JOLED, Inc., Atsugi-si, Kanagawa, Japan

67.3: ***Invited Paper:*** **Flexible Substrate Engineering to Enhance Bending Stability**
Yoonyoung Chung, Pohang University of Science and Technology, Pohang, South Korea

67.4: ***Late-News Paper/Distinguished Paper:*** **5.8-inch QHD Flexible AMOLED Display with Enhanced Bendability of LTPS TFTs**
Jaeseob Lee, Samsung Display Co., Ltd., Gyeonggi-do, South Korea

Session 68: OLED Displays *(OLEDs)*
Thursday, May 24, 2018 / 3:10 - 4:30 pm / Room 502B
Chair: *Yasunori Kijima, Huawei Technologies Co., Ltd.*
Co-Chair: *Vincent Tseng, Tianma Microelectronics Group*

68.1: ***Invited Paper:*** **Reliability and Failure-Mode Analysis of Foldable AMOLED-Display Module**
Li Lin, Kunshan Govisionox Optoelectronics Co., Ltd, Kunshan, Jiangsu, China

68.2: ***Invited Paper:*** **Challenges for High-Resolution AMOLED Displays**
D.Z. Peng, Tianma Microelectronics Group, Shanghai, China

68.3: **Study on the Relationship between Fluorescence Dye Combination and Process Temperature of Photoresist**
Seungbeom Lee, LG Display Co., Ltd., Gyeonggi-do, South Korea

68.4: **Top-Emission OLED Kawara-Type Multidisplay with Auxiliary Electrode**
Daiki Nakamura, Semiconductor Energy Laboratory Co., Ltd., Atsugi-si, Kanagawa, Japan

Session 69: Capacitive-Touch Displays *(Touch and Interactive Displays)*
Thursday, May 24, 2018 / 3:10 - 4:30 pm / Room 501
Chair: *John Zhong, Apple, Inc.*
Co-Chair: *Deuk Su Lee, LG Display Co., Ltd.*

69.1: **A 43-in. UHD Digital Kiosk System Using Advanced In-Cell Touch Technology**
jaehun Jun, LG Display Co., Ltd., Gyeonggi-do, South Korea

69.2: **Overcoming an Abnormal Horizontal Dim Lines of an In-Cell Touch Display**
Wei Xue, Hefei BOE Optoelectronics Technology Co., Ltd., Hefei, Anhui, China

69.3: ***Distinguished Paper:*** **Development of Mid-Sized Full In-Cell LCD Module for PCs with IGZO**
Masayuki Hata, Sharp Corp., Nara, Japan

69.4: ***Invited Paper:*** **A Programmable Capacitive Imaging Technique Using Multiple Sigma-Delta Modulators for High-SNR Touch Sensor and Pens**
Gerald Morrison, SigmaSense LLC, Austin, TX, US

Session 70: Projection: Screen Technology *(Display Systems)*
Thursday, May 24, 2018 / 3:10 - 4:30 pm / Room 503
Chair: *Satoshi Ouchi, Hitachi, Ltd.*
Co-Chair: *Sergei Yakovenko, Apple, Inc.*

70.1: **Unphotogenic Light: Evaluation and Detail of the High-Speed Projection Method to Prevent Secret Photography by Small Cameras**
Ippei Suzuki, University of Tsukuba, Tsukuba-shi, Ibaraki, Japan

70.2: **Projection-Based Multi-View Three-Dimensional Display with Angular Steering Screen**
Xinxing Xia, Nanyang Technological University, Singapore

70.3: ***Distinguished Student Paper:*** **Novel Directional Projection Screen using Diverted Curved-Surfaces Cube-Corner Reflector (D-CCR)**
Ryosuke Ohtera, Natinonal Institute of Technology, Sendai College, Sendai, Japam

70.4: **Higher-Contrast and Lower-Haze Transparent Screen Using Waving Cholesteric Liquid Crystals**
Yujiro Yanai, FUJIFILM Corp., Minamiashigara-shi, Kanagawa, Japan

Session 71: High Image Quality *(Liquid-Crystal Technology)*
Thursday, May 24, 2018 / 3:10 - 4:30 pm / Room 518
Chair: *Akihiro Mochizuki, I-CORE Technology, LLC*
Co-Chair: *Jae Hoon Kim, Hanyang University*

71.1: ***Invited Paper:*** **A Color Conversion Film with High Quantum Yield and Operational Stability**
Hoyoung Lee, LG Chem, Advanced Materials R&D, Daejeon, South Korea

71.2: ***Invited Paper:*** **Development Trend of LCD Technology**
Xiang Feng, Beijing BOE Display Technology Co., Ltd., Beijing, China

71.3: **A New Solution without Quantum Dots for LCDs to Achieve More Than that for a BT.2020 LCD**
Jack Fan, Shenzhen China Star Optoelectronics Technology Co., Ltd., Shenzhen, China

71.4: **New LCD with 97.3% Rec.2020 Color Gamut**
Haiwei Chen, College of Optics and Photonics, University of Central Florida, Orlando, FL, US

71.5: ***Invited Paper:*** **Liquid Crystals for Dynamic Vision Correction**
Tigran Galstian, Lensvector Inc., San Jose, CA, US

Session 72: Measurement Challenges for Near-to-Eye Displays *(AI and AR & VR / Display Measurement)*
Friday, May 25, 2018 / 9:00 - 10:20 / Room 515A
Chair: *Michael Becker, Display-Messtechnik&Systeme*
Co-Chair: *Chuck Yin, Oculus*

72.1: **Requirements for Lenses in Measuring Systems Evaluating Near-to-Eye Displays**
Norbert Schuster, Sustar-Optics, Heilbronn, Germany

72.2: **Standardizing Fundamental Criteria for Near-to- Eye Display Optical Measurements: Determining Eye-Point Position**
Russell Draper, U.S. Army CERDEC, NVESD, Ft. Belvoir, VA, US

72.3: **Contrast, Resolution, and Parallax Measurements of Near-to-Eye and Head-Up Displays**
Richard Austin, Gamma Scientific, Inc., San Diego, CA, US

72.4: **Head-Movement-Based Motion-Blur Measurement System for Head-Mounted Displays**
Suk-Ju Kang, Sogang University, Seoul, South Korea

Session 73: QD Electroluminescence I *(Emissive Displays)*
Friday, May 25, 2018 / 9:00 - 10:20 am / Room 515B
Chair: *Jonathan Steckel, Apple, Inc.*
Co-Chair: *Yajie Dong, University of Central Florida*

73.1: **Fully Ink-Jet-Printed Pixelated RGB Quantum-Dot LEDs**
Fushan Li, Fuzhou University, Fuzhou, China

73.2: ***Invited Paper:*** **High-Performance Quantum-Dot LEDs and Their Challenges**
Krishna Acharya, NanoPhotonica, Inc., Gainesville, GA, US

73.3: ***Distinguished Student Paper:*** **Full-Color Quantum-Dot LEDs Patterned by Photolithography Technology**
Tingjing Ji, Southern University of Science and Technology, Shenzhen, China

73.4: **Tandem Red Quantum-Dot LEDs with External Quantum Efficiency Over 34%**
Qiang Su, Southern University of Science and Technology, Shenzhen, China

Session 74: High-Ambient Contrast Ratio I *(Liquid-Crystal Technology)*
Friday, May 25, 2018 / 9:00 - 10:20 am / Room 502A
Chair: *Takahiro Ishinabe, Tohoku University*
Co-Chair: *Shin-Tson Wu, University of Central Florida*

74.1: ***Invited Paper:*** **Can LCDs Outperform OLED Displays in Ambient Contrast Ratio?**
Shin-Tson Wu, College of Optics and Photonics, University of Central Florida, Orlando, FL, US

74.2: **Sunlight-Readable Low-Reflection FFS-LCD**
Yuichi Kawahira, Sharp Corp., Nara, Japan, Japan

74.3: **Polarized Light-Emitting Films for Transparent and Self-Emissive LCDs**
Noriaki Mochizuki, Nippon Kayaku Co., Ltd., Tokyo, Japan

74.4: **High-Image-Quality Transparent AMOLED Display with a Dichroic-Dye-Doped Cholesteric-Liquid-Crystal Back-Panel**
Tsung-Hsien Lin, National Sun Yat-Sen University, Kaohsiung, Taiwan, ROC

74.5: ***Late-News Paper:*** **High Dynamic Range Incell LCD with Excellent Performance**
Zhuo Deng, Xiamen Tianma Microelectronics Co., Ltd., Xiamen, China

Session 75: High-Resolution OLED-Display Manufacturing *(Display Manufacturing)*
Friday, May 25, 2018 / 9:00 - 10:20 am / Room 502B
Chair: *Robert Visser, Applied Materials*
Co-Chair: *Tian Xiao, CBRITE, Inc.*

75.1: ***Distinguished Paper:*** **High-Resolution Photolithography for Direct-View AMOLED AR Displays**
Pawel Malinowski, imec, Leuven, Belgium

75.2: **Novel Plane Source FMM Evaporation Techniques for Manufactruring of 2250-ppi Flexible AMOLEDs**
Changhun Hwang, OLEDON, Gyeonggi-do, South Korea

75.3: **UV-Curable Thin-Film Packaging for OLED-Based Microdisplays**
Marion Provost, University Grenoble Alpes, CEA-LETI, Grenoble, France

75.4: ***Invited Paper:*** **FMM Materials and Manufacturing Process: Review of the Technical Issues**
Kisoo Kim, APS Holdings Corp., Hwaseong-si-Gyeonggi-do, South Korea

Session 76: Fingerprint Sensing and Optical Sensing Displays *(Touch and Interactive Displays)*
Friday, May 25, 2018 / 9:00 - 10:20 am / Room 501
Chair: *Steven Bathiche, Microsoft*

Co-Chair: *Martin Grunthaner, Apple, Inc.*

76.1: ***Invited Paper:*** **A New Full-Screen Flexible AMOLED Solution with Fingerprint**
Feng Zhou, BOE Technology Group Co., Ltd., Beijing, China

76.2: ***Invited Paper:*** **Optical Fingerprint Sensor Based on TFT technology**
Hong Zhu, Shanghai OXi Technology Co., Ltd., Shanghai, China

76.3: **A New Photosensitive Oxide Diode**
Myeongho Kim, Hanyang University, Seoul, South Korea

76.4: ***Late-News Paper:*** **Flat Panel Fingerprint/Touch-input Image Sensor Using a-Si TFT Photo-Transistor and Four-Mask Process Architecture Technology**
An-Thung Cho, Chongqing HKC Optoelectronics Technology, ChongQing, China

Session 77: Advances in LED Lighting *(Lighting)*

Friday, May 25, 2018 / 9:00 - 10:20 am / Room 503

Chair: *Mike Lu, Acuity Brands Lighting*

Co-Chair: *Marina Kondakova, OLEDWorks*

77.1: ***Invited Paper:*** **Modelling Visibility of Temporal Light Artefacts**
Malgorzata Perz, Philips Lighting Research, Eindhoven, The Netherlands

77.2: **Monolithic Integration of LED Matrices and Electronic Devices for Lighting and Display Applications**
Jian Xu, Penn State University, University Park, PA, US

77.3: **Development of CCT-Tunable White LEDs for Circadian Lighting**
Jay Liu, ShineOn Beijing Technology Co., Ltd., Beijing, China

77.4: **Tuning the CCT of White LEDs with an Active Color Filter**
Ziqian He, College of Optics and Photonics, University of Central Florida, Orlando, FL, US

Session 78: Color Gamut *(Applied Vision)*

Friday, May 25, 2018 / 9:00 - 10:20 am / Room 518

Chair: *Cheng Chen, Apple, Inc.*

Co-Chair: *Youngshin Kwak, Ulsan National Institute of Science and Technology*

78.1: **Correcting Metameric Failure of Wide-Color-Gamut Displays**
Ben Bodner, LG Electronics, Santa Clara, CA, US

78.2: **A Matrix-Based Method of Color Correction for Metamerism Failure between LCD and OLED Displays**
Jingyu Fang, Huawei Technologies Co., Ltd., Shanghai, China

78.3: **2D Representation of Display Color Gamut**
Kenichiro Masaoka, NHK Science & Technology Research Laboratories, Setagaya-ku, Tokyo, Japan

78.4: **Visual Evaluation of Displays 3D Color-Gamut Volume**
Youngshin Kwak, Ulsan National Institute of Science and Technology, Ulsan, South Korea

Session 79: Enhancements to AR/VR *(AI and AR & VR / Emerging Technologies and Applications)*

Friday, May 25, 2018 / 10:40 am - 12:00 pm / Room 515A

Chair: *Susan Jones, Nulumina Corp.*

Co-Chair: *Fang-Cheng Lin, Apple, Inc.*

79.1: ***Invited Paper:*** **Accommodative AR HMD Using Birefringent Crystal**
Byoungho Lee, Seoul National University, Seoul, South Korea

79.2: ***Distinguished Student Paper:*** **Compact See-Through Near-to-Eye Display with Depth Adaption**
Yun-Han Lee, College of Optics and Photonics, University of Central Florida, Orlando, FL, US

79.3: **Color Adjustment for Video-See-Through AR and Camouflage Application**
Yu-Kai Chen, National Chiao-Tung University, Hsinchu, Taiwan, ROC

79.4: **A Plastic Electrochromic Dimming Device for Augmented-Reality Glasses**
Akio Machida, SONY Corp., Atsugi-shi, Kanagawa, Japan

79.5: ***Late-News Paper:*** **Ultra-Thin Variable Transmission Smart Window by One-Step Patterned Photoalignment**
Su Pan, The Hong Kong University of Science and Technology, Kowloon, Hong Kong

Session 80: QD Electroluminescence II *(Emissive Displays)*

Friday, May 25, 2018 / 10:40 am - 12:00 pm / Room 515B

Chair: *Ruiqing Ma, Nanosys*

Co-Chair: *Khaled Ahmed, Intel Corp.*

80.1: ***Invited Paper:*** **Developing AMQLED Technology for Display Applications**
Yanzhao Li, BOE Technology Group Co., Ltd., Beijing, China

80.2: **AMQLED Display with Solution-Processed Oxide-TFT Backplane**
Jin Jang, Kyung Hee University, Seoul, South Korea

80.3: **Research on ZnO-MgO QDs and Its Application in QLEDs**
Qing Li, Southeast University, Nanjing, China

Session 81: High Ambient Contrast Ratio II *(Liquid-Crystal Technology)*

Friday, May 25, 2018 / 10:40 am - 12:00 pm / Room 502A
Chair: *Seung Hee Lee, Chonbuk National University*
Co-Chair: *Joun-Ho Lee, LG Display Co., Ltd.*

81.1: **High-Transmittance and High-Contrast LCD for 3D Head-Up Displays**
Mitsuhiro Murata, Kyocera Display Corp., Yasu, Japan

81.2: **Novel IPS-Mode with High Transmittance Using a Negative Dielectric Liquid Crystal**
You Hyun Eom, LG Display Co., Ltd., Gyeonggi-do, South Korea

81.3: **Effects of Flexoelectricity and I_{on} on the Flicker of FFS-LCDs**
Yingfei Jiang, Liquid Crystal Institute, Kent State University, Kent, OH, US

81.4: **Advancement of E-O properties in Nano-Phase-Separated LCs**
Toru Fujisawa, DIC Corp., Ina, Japan

Session 82: Flexible-Display Manufacturing *(Display Manufacturing)*
Friday, May 25, 2018 / 10:40 am - 12:00 pm / Room 502B
Chair: *Greg Gibson, nTact*
Co-Chair: *Bradley Bowden, Corning Research and Development Corp.*

82.1: ***Invited Paper:*** **Large-Area Thin-Film Encapsulation from Bendable to Rollable and Foldable**
Helinda Nominanda, Applied Materials, Santa Clara, CA, US

82.2: **Substrate-Free Flexible Electronics Manufacturing by Weak-Bonding Method**
Tsung-Ying Ke, AU Optronics Corp., Hsinchu, Taiwan, ROC

82.3: **Temporary Bonding Alternative to Laser Lift-Off for Flexible Displays**
Radu Reit, Ares Materials, Dallas, TX, US

82.4: ***Late-News Paper:*** **Effects of the Anchoring Polymer Layer(APL) Materials on Conductive Particle Movements for Ultra-Fine Pitch Chip-on-Glass(COG) Interconnection**
Dal-Jin Yoon, KAIST, Daejeon, South Korea

82.5: ***Late-News Paper:*** **High-Resolution Printing for Future Processing of RGB OLED Displays**
Christine Boeffel, Fraunhofer IAP, Potsdam, Germany

Session 83: Interactive Displays *(Touch and Interactive Displays)*
Friday, May 25, 2018 / 10:40 am - 12:00 pm / Room 501
Chair: *Patrick Worfolk, Synaptics*
Co-Chair: *Jeff Han, perceptiveIO, Inc.*

83.1: **Enhancing the Performance of Display-Integrated NFC Antenna by Magnetic-Resonance Coupling for Secure Contactless Payment Transactions and for IOT**
Jean de Dieu Mugiraneza, Sharp Corp., Display Device Company, Nara, Japan

83.2: **LCD Panel with Integrated Piezoresistive Sensors**
Feng Lu, Shanghai Tianma Micro-Electronics Co., Ltd., Shanghai, China

83.3: **Capacitive-Touch-Screen-Integrated Electrostatic Tactile Display with Localized Sensation**
Hiroshi Haga, Tianma Japan, Ltd., Kawasaki, Kanagawa, Japan

83.4: **Investigation on Quantitative Simulation Method of ITO Index Matrix**
Baoran Li, Hefei XinSheng Opto-electronic Technology Co. Ltd., Hefei, Anhui, China

Session 84: OLED for Lighting and Imaging *(Lighting)*
Friday, May 25, 2018 / 10:40 am - 12:00 pm / Room 503
Chair: *Marina Kondakova, OLEDWorks*
Co-Chair: *Mike Lu, Acuity Brands Lighting*

84.1: ***Invited Paper:*** **Advances in High-Efficacy and Flexible OLED Lighting**
Jeffrey Spindler, OLEDWorks LLC, Rochester, NY, US

84.2: ***Invited Paper:*** **High-Refractive-Index Light Extraction for OLED Lighting**
Gregory Cooper, Pixelligent Technologies LLC, Baltimore, MD, US

84.3: ***Invited Paper:*** **OLED Beam Shaping: Pixel Design for Variable Angular Emission Profile Control**
Sebastian Reineke, Technische Universität Dresden, Dresden, Germany

84.4: ***Invited Paper:*** **Near-Infrared Organic Upconversion Device with High Image-Sensing Quality**
Shun-Wei Liu, Ming-Chi University of Technology, New Taipei City, Taiwan, ROC

Session 85: Image Quality *(Applied Vision)*
Friday, May 25, 2018 / 10:40 am - 12:00 pm / Room 518
Chair: *Jennifer Gille, Qualcomm*
Co-Chair: *Sakuichi Ohtsuka, Kagoshima University*

85.1: **Visually Lossless Compression of High-Dynamic-Range Images: A Large-Scale Evaluation**
Aishwarya Sudhama, York University, Toronto, Ontario, Canada

85.2: **Subjective Evaluation of Moving Picture Quality on 4K OLED and LCD TVs for Analyzing Device Response in Detail**
Isao Kawahara, FairSpec & Co. LLC, Toyonaka-si, Osaka, Japan

85.3: ***Distinguished Student Paper:*** **Image-Content-Adaptive Color-Breakup Index for Field-Sequential-Color Displays Using Dominant Visual Saliency Method**
Ying-Ju Lin, National Chiao-Tung University, Hsinchu, Taiwan, ROC

85.4: **A Subpixel-Based Objective Image-Quality Metric with Application to Visually Lossless Image-Compression Evaluation**
Gregory Cook, Samsung Display America Laboratory, San Jose, CA, US

Poster Session
Thursday, May 24, 2018 / 5:00 – 8:00 pm / Petree Hall

Active-Matrix Devices

P.1: **A New Method of Verificating Charging Compensation in 8K4K 120Hz Large LCDs by Using Small Panel**
Guangliang Shang, BOE Technology Group Co., Ltd., Beijing, China

P.2: **The Improved Photosensitivity of Amorphous In-Ga-Zn-O TFTs with Gap-type Structure**
Po-Chun Chan, National Chiao-Tung University, Hsinchu, Taiwan, ROC

P.3: **TCAD Modeling of Ion Transport for Simulation of Degradation in an Amorphous InGaZnO Thin Film Transistor**
Sungwon Kong, Silvaco, Santa Clara, CA, US

P.4: **Reliability Analysis and Improvement of Self-Aligned Coplanar a-IGZO TFTs for OLED Display**
Zhen Song, BOE Technology Group Co., Ltd., Beijing, China

P.5: **The Effect of Light-Shield Metal Layer on the IV Performance of the p-Type LTPS TFT**
Meng Zhao, BOE Technology Center, Beijing, China

P.6: **Development of Advanced Etch-Stop Structures Oxide TFT**
Wang Rui, BOE Optoelectronics Technology Co., Ltd., Chongqing, China

P.7: **WITHDRAWN**

P.8: **The Analysis of Effective Channel Length in a-IGZO TFTs with the Top IGZO layer**
Won Il Han, LG Display Co., Ltd., Paju-si, Gyeonggi-do, South Korea

P.9: **WITHDRAWN**

P.10: **A Study on Bending Tolerance of Hybrid IGZO TFTs Fabricated on PEN Films**
Yu-Hsing Liang, AU OptronicS Corp., Hsinchu, Taiwan, ROC

P.11: **Inkjet-Printed p-Type Cu:NiO Thin-Film Transistor**
Fushan Li, Fuzhou University, Fuzhou, China

P.12: **Novel 1-to-N Architecture of Bidirectional Gate Driver for Ultra-Narrow-Border Display**
Hongtao Huang, Nanjing CEC Panda FPD Technology Co., Nanjing, China

P.13: **Electrical Characteristics and Stability of Double-Gate a-IGZO Thin Film Transistors with Self-Aligned Top-Gate**
Xiaodong Zhang, Peking University, Shenzhen, China

P.14: **Transient Response Properties of Nitrogen-Doped Amorphous InGaZnO Thin Film Transistors**
Chengyuan Dong, Shanghai Jiao Tong University, Shanghai, China

P.15: **The Use of Fluorination to Enhance the Performance and the Reliability of Elevated-Metal Metal-Oxide Thin-Film Transistors**
Zhihe XIA, The Hong Kong University of Science and Technology, Kowloon, Hong Kong

P.16: **The Impact of Deposition Rate and Hydrophobicity of Passivation Layer on the Stability of Back-Channel-Etch Amorphous InGaZnO Thin-Film Transistors**
Gong-Tan Li, Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd., Shenzhen, China

P.17: **Novel Pixel Circuit with Inverter Structure Based on a-IGZO TFT for Blue-Phase Liquid Crystal Displays**
Chih-Lung Lin, National Cheng Kung University, Tainan city, Taiwan, ROC

P.18: **Improvement of Reliability in Coplanar a-IGZO TFTs by Multilayer SiO2 Gate Insulator**
Se Hee Park, LG Display Co., Ltd., Paju-si, Gyeonggi-do, South Korea

P.19: **Effect of RTP Annealing Using UV and DUV Light on the Properties of the Al-IZTO TFTs**
Sang-Hee Ko Park, KAIST, Daejeon, South Korea

P.20: **Towards High-Performance and Cost-Effective Top-Gated Oxide TFTs with Hybrid-Phase Microstructural Channels**
Sunbin Deng, The Hong Kong University of Science and Technology, Kowloon, Hong Kong

P.21: **Three-Mask Elevated-Metal Metal-Oxide Thin-Film Transistor Technology for High-Resolution AMOLED Application**
Jiapeng LI, The Hong Kong University of Science and Technology, Kowloon, Hong Kong

P.22: **Fabrication of Oxide-Based Phototransistors for Visible Light Detection via Nanowire Interfaces**
Hyun Jae Kim, Yonsei University, Seoul, South Korea

P.23: **Fabrication of Eco-Friendly Solution-Processed Indium Zinc Oxide Thin-Film Transistors Through Recycling Based on Photocatalytic Reactions of TiO2**
Hyun Jae Kim, Yonsei University, Seoul, South Korea

P.24: **Integrated Gate Driver for 2700-ppi 8K 120Hz Displays Using a-IGZO TFTs**
Jin Jang, Kyung Hee University, Seoul, South Korea

P.25: **OLED Displays with a Specialized Pixel Circuit for Automotive Applications**
Yoshihiro Nonaka, Tianma Japan, Ltd., Kawasaki, Kanagawa, Japan

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