



# ADVANCE PROGRAM

## 2021 VIRTUAL DISPLAY WEEK INTERNATIONAL SYMPOSIUM

May 17-21 (Monday – Friday)

### Session 1: Annual SID Business Meeting

### Session 2: Opening Remarks / Keynote Addresses

### Session 3: Flexible TFTs I (Active Matrix Devices / Flexible Displays and E-paper)

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

**Co-Chair:** Kenichi Takatori, Huawei Technologies Japan K.K.

- 3.1: **Distinguished Paper:** Foldable LTPS TFT Backplane using Blue Laser Annealing  
*Jin Jang, Kyung Hee University, Seoul, South Korea*
- 3.2: **Invited Paper:** Instability Improvement of LTPS TFT for Flexible AMOLED Display  
*Tom Chen, Visionox Technology Inc, Gu'An, China*
- 3.3: **Invited Paper:** Development of Organic TFT Technology for Active-Matrix Display Backplane  
*Xiaojun Guo, Shanghai Jiao Tong University, Shanghai, China*
- 3.4: **Invited Paper:** All-Inkjet-Printed Low-Voltage Organic Thin-Film Transistors  
*Chen Jiang, University of Cambridge, Cambridge, United Kingdom*

### Session 4: Flexible TFTs II (Active Matrix Devices / Flexible Displays and E-paper)

**Chair:** Xiaojun Guo, Shanghai Jiao Tong University

**Co-Chair:** Yusin Lin, Applied Materials, Inc.

- 4.1: **Invited Paper:** Highly Robust Flexible IGZO TFTs and Integrated Circuits  
*Sung Kyu Park, Chung-Ang University, Seoul, South Korea*
- 4.2: **Invited Paper:** High Performance Top Gate Oxide TFT Technology for Large Area Flexible AMOLED Display  
*Weiran Cao, Shenzhen China Star Optoelectronics Semiconductor Display Technology Co. Ltd., Shenzhen, China*
- 4.3: **Distinguished Paper:** IGZO TFT Arrays for Biometrics-Under-Display and Biomedical Applications  
*Auke Jisk Kronemeijer, TNO / Holst Centre, Eindhoven, Netherlands*

### Session 5: LTPS TFTs (Active Matrix Devices)

**Chair:** Norbert Fruehauf, University of Stuttgart

**Co-Chair:** Mike Hack, Universal Display Corporation

- 5.1: **Invited Paper:** LTPS TFT Full Color MicroLED Display with Redundant Pixel Design and Covering Micro-Reflector Array  
*Masaya Tamaki, Kyocera Corporation, Yasu, Japan*
- 5.2: **Enhanced Bending Endurance with Transverse Tensile Strain and 4-Terminal Double-Gate LTPS TFTs for Flexible AMOLED**  
*Jaeseob Lee, Samsung Display, Youngin, South Korea*
- 5.3: **Experimental and Physics-Based Analysis of Leakage Currents for LTPS TFTs in AMOLED Displays**  
*Keunwoo Kim, Samsung Display, Youngin, South Korea*

### Session 6: Photodiode Image Sensors for Fingerprint under OLED (Active Matrix Devices / Interactive Displays and Systems)

**Chair:** Sang Hee Park, KAIST

**Co-Chair:** Patrick Worfolk, Synaptics

- 6.1: **Invited Paper:** Measuring Health Parameters with Large-Area Organic Photodetector Arrays  
*Gerwin Gelinck, TNO/Holst Centre, Eindhoven, Netherlands*
- 6.2: **Invited Paper:** An Imager with Organic Photodetectors Based on LTPS-TFT Technology  
*Takashi Nakamura, Japan Display Inc., Chiba, Japan*
- 6.3: **Fingerprint on Display Module based on Organic Optical Sensors for 1 to 4-fingers Authentication within Next Generation Smartphones**  
*François Flamein, Isorg, Grenoble, France*
- 6.4: **Organic Optical Sensor Based on a-Si TFT Backplane Used in Fingerprint Identification Under OLED Display**  
*Lin Zhou, Beijing BOE Sensor Technology Co., Ltd., Beijing, China*

### Session 7: Oxide TFTs I (Active Matrix Devices)

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

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

- 7.1: **Reliability Improvement of IGZO-TFT in Hybrid Process with LTPS**  
*Mehadi Aman, Sharp Display Technology Corporation, Tenri, Japan*

- 7.2: **Invited Paper: A 40 nm Gate Length Surrounding Gate Vertical-Channel FET Using Thermally Stable In-Al-Zn-O Channel for 3D CMOS-LSI Applications**  
Yuta Sato, KIOXIA Corporation, Kanagawa, Japan
- 7.3: **Invited Paper: High Mobility Self-Aligned Coplanar Thin-Film Transistors with a Novel Dual Channel Oxide Semiconductor Architecture**  
Jung Bae Kim, Applied Materials, Santa Clara, CA US
- 7.4: **High Mobility Hydrogenated Polycrystalline In-Ga-O (IGO:H) Thin-Film Transistors formed by Solid Phase Crystallization**  
Mamoru Furuta, Kochi University of Technology, Kami, Japan
- 7.5: **Invited Paper: Bilayer Tunneling Field Effect Transistors using Oxide Semiconductor/ Group-IV Semiconductor Hetero-structures**  
Shinichi Takagi, The University of Tokyo, Tokyo, Japan

### Session 8: Oxide TFTs II (Active Matrix Devices)

**Chair:** Hyun Jae Kim, Yonsei University

**Co-Chair:** Junho Song, Korea University

- 8.1: **Distinguished Paper: A Cost-Effective Fluorination Method for Enhancing the Performance of Metal Oxide Thin-Film Transistors Using a Fluorinated Planarization Layer**  
Sunbin Deng, The Hong Kong University of Science and Technology, Kowloon, Hong Kong
- 8.2: **Low Cost Manufacturing of AlZnO/ZnO Thin Film Transistor with High Mobility Over 80 cm<sup>2</sup>/Vs and Positive Threshold Voltage by Spray Pyrolysis**  
Jin Jang, Kyung Hee University, Seoul, South Korea
- 8.3: **Invited Paper: Back-Channel Defect Termination for p-Channel Oxide-TFTs**  
Kenji Nomura, University of California, San Diego, La Jolla, CA US
- 8.4: **Invited Paper: Transparent Zn Doped-CuI for High-Performance p-Channel Thin Film Transistors**  
Yong-Young Noh, Pohang University of Science and Technology, Pohang, South Korea
- 8.5: **Invited Paper: P-Type Oxide Semiconductors for Displays: Material Design and Field-Effect Devices**  
Kelvin Zhang, Xiamen University, Xiamen, China

### Session 9: Display Manufacturing (Display Manufacturing)

**Chair:** Joerg Winkler, PLANSEE SE

**Co-Chair:** Chiwoo Kim, APS Holdings

- 9.1: **Fabrication of Lateral Crystal Si on Cu Bottom Gate Structure by Blue Laser Diode Annealing (BLDA)**  
Seiya Toriyama, V Technology Co., Ltd., Yokohama, Japan
- 9.2: **MOVED TO P.108**
- 9.3: **Performance of New Gen. 6 Exposure Tools for 1.2 μm Resolution**  
Nobuhiko Yabu, Canon Inc., Utsunomiya, Japan
- 9.4: **Fabrication of Oxide-Semiconductor FETs with Submicron Channel Length**  
Yasuharu Hosaka, Semiconductor Energy Laboratory Co., Ltd., Tochigi, Japan
- 9.5: **Picosecond Laser Blackening TFT Side Films: A New Technology to the Research of Bright Pixel Repair**  
He-Wei Wang, Hefei BOE Display Technology Co., Ltd., Hefei, China

### Session 10: Flexible Display Manufacturing (Display Manufacturing / Flexible Displays and E-paper)

**Chair:** Bradley Bowden, Corning Research and Development Corporation

**Co-Chair:** Shiming Shi, BOE Technology Group Co., Ltd.

- 10.1: **Invited Paper: An In Depth Comparison of Methods to Evaluate Bending Failure for Flexible Electronics**  
Megan Cordill, Austrian Academy of Sciences, Leoben, Austria
- 10.2: **Study of an Ultra-fast Photonic Soldering Technology without Thermal Damage in Display Module Package**  
Ming-Jaan Ho, Avary Holding (Shenzhen) Co., Limited, Shenzhen, China
- 10.3: **The Electrical Connection of In-cell Touch between Two Individual Substrates in 5.6-inch Flexible AMOLED Displays**  
Shu-Te Ho, AU Optronics, Hsinchu, Taiwan Roc

### Session 11: OLED Deposition & Patterning (Display Manufacturing)

**Chair:** Neetu Chopra, Apple Inc

**Co-Chair:** Greg Gibson, nTact

- 11.1: **Sensitivity Analysis of Mechanical Parameters to Tensile Wrinkle in Fine-Metal Mask**  
Yue Liu, BOE Technology Group Co., Ltd, Beijing, China
- 11.2: **Technology Developments in High-Resolution FMM-free OLED and BEOL IGZO TFTs for Power-Efficient Microdisplays**  
Tung-Huei Ke, imec, Leuven, Belgium
- 11.3: **2,400ppi RGB Side-by-Side OLED Micro-Display for AR Applications**  
Chiwoo Kim, APS Holdings, Kyungki, South Korea
- 11.4: **Ionization Electric Field Organic Material Deposition Method for Reducing Mask Shadow Effect**  
Heemin Park, Samsung Display Co., Ltd., Giheung, South Korea
- 11.5: **First Plane Source Evaporator for 100x100mm OLED.**  
Changhun Hwang, OLEDON, Yongin, South Korea

### Session 12: Optical Components (Display Manufacturing)

**Chair:** Yukio Endo, AGC Inc.

**Co-Chair:** Toshiaki Arai, JOLED Inc

**12.1:** **Controlling the Pixel Colors of Quantum Dot Thin Films by Patterning the Substrates**

Xiao Wei Sun, Southern University of Science and Technology, Shenzhen, China

**12.2:** **Photo-Patternable Organic Materials for Display**

Ryutaro Sugawara, Tokyo Ohka Kogyo Company Ltd., Kanagawa, Japan

### **Session 13: Display Algorithms (Display Electronics)**

**Chair:** Paul Oh, LG Display

**Co-Chair:** Mainak Biswas, Google

**13.1:** **Invited Paper: Color Quality for Large MicroLED TV**

YungKyung Park, Ewha Womans University, Seoul, South Korea

**13.2:** **A Novel Compensation Algorithm for First Frame-Drop on AMOLED**

Shang-Yu Su, Novatek Microelectronics Corporation, Hsinchu, Taiwan Roc

**13.3:** **Invited Paper: Video Frame Interpolation via Structure Motion based Iterative Feature Fusion**

Meng Cao, Apple, Cupertino, CA US

**13.4:** **Late-News Paper: Adaptive Threshold Method for Dither Noise Reduction in Response Time Acceleration for 8K LCD TV**

Ho-Joon Chung, Samsung Electronics Co. Ltd., Hwasung, South Korea

### **Session 14: Innovative Display Circuits (Display Electronics)**

**Chair:** Prof. Soo-Yeon Lee, Seoul National University

**Co-Chair:** Carlin Vieri, Google

**14.1:** **A Multi-Unit Compensation for OLED Burn-In in the Mobile Display**

Jiheon Ok, Samsung Electronics Co. Ltd., Hwaseong, South Korea

**14.2:** **Data Line Driver with Gray-level Dependent Far-End Auxiliary Driving for Large AMOLED Display Panel**

Hailong Jiao, Peking University, Shenzhen, China

**14.3:** **OLEDs Microdisplay with OLED Threshold Voltage Detection and Fast-Progressive Compensation**

Hailong Jiao, Peking University, Shenzhen, China

### **Session 15: Interface and Driver Circuits (Display Electronics)**

**Chair:** Carlin Vieri, Google

**Co-Chair:** Hyoungsik Nam, Kyung Hee University

**15.1:** **High Resolution Display Data Transmission using Weak Sub-Color DWT**

Joonhee Lee, LG Display, Seoul, South Korea

**15.2:** **Programmable LTPS TFT Gate Driver with Tunable Pulse Width for Adjusting AMOLED Brightness**

Junjun An, Peking University, Shenzhen, China

**15.3:** **Late-News Paper: Hydrogenated Amorphous Silicon Gate Driver on Array with Time-Division Driving Method for In-Cell Touch Liquid-Crystal Display**

Liu Po-Tsun, National Chiao-Tung University, Hsinchu, Taiwan Roc

### **Session 16: Machine Learning for Display Manufacturing and Measurement (Machine Learning for Displays / Display Manufacturing / Display Measurement)**

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

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

**16.1:** **Tap Point Skipping and Measurement Path Optimization for Gamma Tuning Algorithm**

Peng Xu, Jingce Electronics, Wuhan, Wuhan, China

**16.2:** **Machine Anomaly Sound Detection using Convolutional Recurrent Neural Network with Prediction Loss**

Hankyeol Lee, LG Display, Seoul, South Korea

**16.3:** **A Visualization Method of Training Data Completeness in Array Defect Recognition Project Based on Deep Learning**

Kai Guo, BOE Technology Group Co., Ltd., Beijing, China

**16.4:** **Invited Paper: Region-Based Machine Learning for OLED Mura Defects Detection**

Janghwan Lee, Samsung Display America Lab., San Jose, CA US

### **Session 17: Machine Learning for Emerging Display Technologies (Machine Learning for Displays / Display Systems / Display Electronics)**

**Chair:** Chaohao Wang, Apple Inc.

**Co-Chair:** Hyoungsik Nam, Kyung Hee University

**17.1:** **Invited Paper: Enhancement of Current Efficiency for OLED Devices Using Meta-Heuristic Algorithm**

Hyunguk Cho, Samsung Display, Youngin, South Korea

**17.2:** **Invited Paper: Simulation Based Artificial Intelligence for Displays**

Yongjo Kim, Samsung Display, Youngin, South Korea

### **Session 18: Imaging through the Display (Machine Learning for Displays / Interactive Displays and Systems)**

**Chair:** Jongseo Lee, Dell

**Co-Chair:** Jeff Han, Consultant

- 18.1: **Far Field Imaging Through Liquid Crystal Display for Biometrics**  
*Timothy Large, Microsoft Corp., Redmond, WA US*
- 18.2: **Invited Paper: Near IR Transparent System (NITS): LCD Enhancement Films Enabling High Performance Near IR Transparent LCDs**  
*Bharat Acharya, 3M, St Paul, MN US*
- 18.3: **Free Viewpoint Teleconferencing Using Cameras Behind Screen**  
*Sehoon Lim, Microsoft Applied Sciences, Redmond, WA US*
- 18.4: **Fast Image Restoration and Glare Removal for Under-Display Camera by Guided Filter**  
*Daewook Kim, Samsung Display, Youngin, South Korea*

### Session 19: OLED Devices I (OLEDs)

**Chair:** Yasunori Kijima, Huawei Technologies Japan K.K.

**Co-Chair:** Ji Ho Baek, LG Display

- 19.1: **Invited Paper: Stable Pure-Blue Hyperfluorescence OLEDs**  
*Chihaya Adachi, Kyushu University, Fukuoka, Japan*
- 19.2: **Invited Paper: Design of Multi-Resonance Thermally Activated Delayed Fluorescence Materials for Organic Light-Emitting Diodes**  
*Eli Zysman-Colman, University of St Andrews, St Andrews, United Kingdom*
- 19.3: **Lifetime Enhancement Towards Commercialization of Hyperfluorescence**  
*Junji Adachi, Kyulux, Fukuoka, FL Japan*
- 19.4: **Ultralong-Life Deep-Blue OLED Device Achieved by Controlling the Carrier Recombination-Site**  
*Takuya Ishimoto, Semiconductor Energy Laboratory Co., Ltd., Atsugi, Japan*

### Session 20: OLED Devices II (OLEDs)

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

**Co-Chair:** Larry Liao, Soochow University

- 20.1: **Invited Paper: Increasing OLED Stability: Plasmonic PHOLED**  
*Nicholas Thompson, Universal Display Corporation, Ewing, NJ US*
- 20.2: **Invited Paper: High-Efficiency, Long-Lifetime Deep-Blue Organic Light-Emitting Diodes**  
*Soon Ok Jeon, Samsung Electronics Co., Ltd., Suwon, South Korea*
- 20.3: **Ultrahigh-Performance Blue Fluorescent OLED Achieving Efficiency Over 250 cd/A/CIEy Utilizing Organic Carrier-Transport Material with Low Refractive Index**  
*Takeyoshi Watabe, Semiconductor Energy Laboratory Co., Ltd., Atsugi, Japan*
- 20.4: **A Nanostructured Diffraction Grating to Overcome the Efficiency Color-Shift Tradeoff in Blue Strong-Cavity, Top-Emitting OLEDs**  
*Stephen Menke, 3M, St. Paul, MN US*

### Session 21: OLED Devices III (OLEDs)

**Chair:** DZ Peng, Tianma

**Co-Chair:** Yasunori Kijima, Huawei Technologies Japan K.K.

- 21.1: **WITHDRAWN**
- 21.2: **Invited Paper: Platinum(II) Based Near Infrared Phosphors for Efficient Organic Light Emitting Diodes with Peak Wavelength Beyond 800 nm**  
*Yun CHI, City University of Hong Kong, Kowloon, Hong Kong*
- 21.3: **Unveiling the Degradation Mechanism of Phosphor-Sensitized Blue Thermally Activated Delayed Fluorescence OLEDs**  
*Hyosup Shin, Samsung Display Co. Ltd., Yongin, South Korea*
- 21.4: **Highly Efficient Near-Infrared Phosphorescent OLEDs**  
*Zhiqiang Ji, Universal Display Corporation, Ewing, NJ US*

### Session 22: OLED Devices IV (OLEDs)

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

**Co-Chair:** CC Lee, BOE Technology Group Co., Ltd.

- 22.1: **Invited Paper: Latest Evolution of Small Molecule Based Emissive Layers for Ink Jet Printed OLED Displays**  
*Sebastian Stolz, Merck KGaA Germany, Darmstadt, Germany*
- 22.2: **Enhanced Orthogonality of Inkjet-Printed OLEDs Emitting Layer by Novel Ink Composition for Electron Transport Layer**  
*Taeheon Kang, Samsung Display, Yongin, South Korea*
- 22.3: **Tuning ETL Mobility by Disorder Passivation**  
*Tobias Neumann, Nanomatch GmbH, Karlsruhe, Germany*
- 22.4: **Invited Paper: OLEDs for Wearables: From Form Factor Engineering to Healthcare Applications**  
*Seunghyup Yoo, KAIST, Daejeon, South Korea*

### Session 23: OLED Displays I (OLEDs)

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

### Co-Chair: *Nicholas Thompson, Universal Display Corporation*

- 23.1: **Invited Paper: Single and Tandem OLED Display Technologies with High Efficiency and Long Lifetime**  
*Masanobu Mizusaki, Sharp Display Technology Corporation, Tenri, Japan*
- 23.2: **A Study on Crucible Inner Pressure Change During Degradation of Liq in AMOLED Mass Production**  
*Sungmoon Kim, DepoLab Inc., Paju, South Korea*
- 23.3: **Self-Assembled Cathode Patterning for Micro-welding in Top Emission AMOLED Displays to Reduce IR Drop**  
*Zhibin Wang, OTI Lumionics Inc., Toronto, ON Canada*
- 23.4: **Ultrathin foldable Organic Light-Emitting Diodes with High Efficiency**  
*ChangYeong Jeong, University of Michigan, Ann Arbor, MI US*

### Session 24: OLED Displays II (OLEDs)

Chair: *Larry Liao, Soochow University*

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

- 24.1: **Invited Paper: Optically Invisible Antenna-on-Display (AoD) Technologies: Review, Demonstration and Opportunities for Microwave, Millimeter-Wave and Sub-THz Wireless Applications**  
*Wonbin Hong, Pohang University of Science and Technology (POSTECH), Pohang, South Korea*
- 24.2: **New Conceptual OLED Based on Highly Simplified Architecture and Fabrication Method**  
*Tomoo Izumi, Konica Minolta, Inc., Hachioji, Japan*
- 24.3: **High Color Gamut OLED Displays with Reduced Power Consumption for Laptop Applications**  
*Mike Hack, Universal Display Corporation, Ewing, NJ US*
- 24.4: **Research on Water Vapor Penetration of OLED Encapsulation**  
*Tao Sun, BOE Technology Group Co., Ltd., Beijing, China*

### Session 25: OLED Material and Device Simulation (OLEDs)

Chair: *Nicholas Thompson, Universal Display Corporation*

Co-Chair: *Sangmo0 Choi, Google LLC*

- 25.1: **Invited Paper: Multiscale Charge Transport Simulation and in Silico Material Design for Highly-Efficient OLEDs**  
*Hironori Kaji, Kyoto University, Uji, Japan*
- 25.2: **Invited Paper: Predicting Excited State Lifetimes from Scratch Using Quantum Theory: Results from the ORCA Software.**  
*Bernardo de Souza, FAccTs GmbH, Cologne, Germany*
- 25.3: **Machine-Learning Assisted Materials Discovery of a Blue Emitter for a More Efficient and Durable OLED Device**  
*Sohae Kim, Samsung Display, Yongin, South Korea*
- 25.4: **The Methodology and Correlation of AI Based Design for OLED Materials**  
*Joong-Hwan Yang, LG Display, Seoul, South Korea*

### Session 26: OLED Materials I (OLEDs)

Chair: *Denis Kondakov, DuPont*

Co-Chair: *Changwoong Chu, Samsung Display Corporation*

- 26.1: **Invited Paper: Boron Based Deep Blue TADF Materials and Hyperfluorescence Devices**  
*Jang Hyuk Kwon, Kyung Hee University, Seoul, South Korea*
- 26.2: **Invited Paper: Efficient and Stable Deep-Blue OLEDs Based on TADF Sensitized Fluorescence (TSF)**  
*Lian Duan, Tsinghua University, Beijing, China*
- 26.3: **Invited Paper: High Performance and Long Device Lifetime Organic Light-emitting Diodes Using a Tetradentate Platinum (II) Emitter**  
*Lei Dai, Guangdong Aglaia Optoelectronic Materials Co., Ltd., Foshan, China*
- 26.4: **High-Performance Multiple-Sensitizing Process Red Hyperfluorescence Device with Assistant Emission Layer (AEL)**  
*Xiaojin Zhang, BOE Technology Group Co., Ltd., Beijing, China*

### Session 27: OLED Materials II (OLEDs)

Chair: *Sven Zimmermann, Novald GmbH*

Co-Chair: *Yuan-Chun Wu, China Star Optoelectronics*

- 27.1: **Invited Paper: Blue Phosphorescent Organic Light-Emitting Diodes for Future Display**  
*Jinwon Sun, Samsung Display, Co., Ltd., Yongin, South Korea*
- 27.2: **Invited Paper: Host Strategy for High-Efficiency and Long-Lifetime Blue Organic Light-Emitting Diodes**  
*Jun Yeob Lee, Sungkyunkwan University, Suwon, South Korea*
- 27.3: **Optimizing Charge Transport and Reducing Excitonic Loss Channels in Fluorescent Doped TADF OLEDs**  
*Roger Häusermann, Fluxim AG, Winterthur, Switzerland*
- 27.4: **Organic Light Emitting Diodes with Directional Polarized Light Emission**  
*Liping Zhu, North Carolina State University, Raleigh, NC US*

### Session 28: OLED Materials III (OLEDs)

Chair: *Chihaya Adachi, Kyushu University*

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

- 28.1: **Invited Paper: Efficient Thermally Activated Delayed Fluorescence Emitters with Preferentially Horizontal Dipole Orientations**  
*Shaolong Gong, Wuhan University, Wuhan, China*



- 28.2: **Invited Paper:** The Development of High-Efficiency Pure Organic Light-Emitting Materials and High-Performance White OLEDs  
*Juan Zhao, Sun Yat-sen University, Guangzhou, China*
- 28.3: **Degradation of Organic Molecular Complex Dependent on Atmosphere**  
*Kihyun Kim, Samsung Display, Yongin, South Korea*
- 28.4: **WITHDRAWN**

### Session 29: AR/VR Foveated Rendering (*Augmented, Virtual and Mixed Reality / Display Systems*)

**Chair:** *W. Hendrick, Collins Aerospace*

**Co-Chair:** *Jean-Pierre Guillou, Apple, Inc.*

- 29.1: **Common Triangle Optimizations and Coarse Pixel Shading for Foveated Rendering Acceleration**  
*Thomas Burnett, FoV13D, Austin, TN US*
- 29.2: **Gaze-Contingent Light Field Rendering for Near-Eye Displays**  
*Chen Gao, Zhejiang University, Hangzhou, China*
- 29.3: **An Easy-To-Implement and Low-Cost VR Gaze Tracking System**  
*Jiankang Sun, Beijing BOE Optoelectronics Technology Co., Ltd., BeiJing, China*
- 29.4: **Invited Paper: Human Eye's Sharp Vision Area Stabilization for VR Headsets**  
*Vladimir Alexandrov, Lomonosov Moscow State University, Moscow, Russian Fed.*

### Session 30: AR/VR Waveguides (*Augmented, Virtual and Mixed Reality / Display Systems / Emerging Technologies and Applications*)

**Chair:** *Dr. Jyrki Kimmel, Kimmel Instruments (tmi)*

**Co-Chair:** *Brian Schowengerdt, Magic Leap*

- 30.1: **Invited Paper: High Aspect Ratio OLED Microdisplay with Pin Mirror Lens for Small Form Factor AR Devices**  
*Chan-Mo Kang, Electronics and Telecommunications Research Institute, Daejeon, South Korea*
- 30.2: **High Refractive Index Glass Wafers for Augmented Reality: Boundary Conditions for an Excellent Optical Performance**  
*Frederik Bachhuber, SCHOTT AG, Mainz, Germany*
- 30.3: **Polarization State Exploration and Management in Waveguide Display with Polarization Volume Gratings**  
*Xiayu Feng, Kent State University, Kent, OH US*
- 30.4: **Late-News Paper: Electroholographic Display Based on a Horizontal Array of Edge-Emitting Surface Acoustic Wave Modulators**  
*Gregg Favalora, The Charles Stark Draper Laboratory, Inc., Cambridge, MA US*

### Session 31: AR/VR Optics - Eyebow Expansion and Multifocal (*Augmented, Virtual and Mixed Reality / Display Systems*)

**Chair:** *Brian Schowengerdt, Magic Leap*

**Co-Chair:** *Zong Qin, Sun Yat-Sen University*

- 31.1: **Invited Paper: Eyeglasses-Style Maxwellian-View Near-eye Display with Lens-Array-Based Holographic Optical Element**  
*Xinxing Xia, Shanghai University, Shanghai, China*
- 31.2: **Distinguished Student Paper: Aberration-Free Pupil Steering Maxwellian Display for Augmented Reality**  
*Jianghao Xiong, University of Central Florida, Orlando, FL US*
- 31.3: **Continuous High-Efficiency Beam Deflector for AR/VR Devices**  
*Comrun Yousefzadeh, Kent State University, Kent, OH US*
- 31.4: **Maxwellian-Viewing-Super-Multi-View Ear Eye Display Using a Pancharatnam-Berry Optical Element**  
*Yan Li, Shanghai Jiao Tong University, Shanghai, China*
- 31.5: **Liquid Crystal Based 5 cm Adaptive Focus Lens to Solve Accommodation-Convergence (AC) Mismatch Issue of AR/VR/3D Displays**  
*Amit K Bhowmick, Kent State University, Kent, OH US*

### Session 32: New Techniques for AR/VR/MR (*Augmented, Virtual and Mixed Reality / Emerging Technologies and Applications*)

**Chair:** *Gary Jones, Nanoquantum Corporation*

**Co-Chair:** *Timothy Large, Microsoft Corp*

- 32.1: **RGBW OLED Micro-displays for Wearable Augmented Reality**  
*Yan Sun, BOE Technology Group Co., Ltd., Beijing, China*
- 32.2: **Distinguished Student Paper: Novel Polarization-Dependent Combiner for Wide Field-of-View Glasses-Like AR Displays**  
*Kun Yin, University of Central Florida, Orlando, FL US*
- 32.3: **Realization of a New MR System Using Display Integrated with Cameras**  
*Jiang Qianwen, Beijing BOE Optoelectronics Technology Co., Ltd., Beijing, China*
- 32.4: **Chromatic Aberration Correction Enabled by Broadband Cholesteric Liquid Crystal Lens for Pancake Virtual Reality Optics**  
*Yannanqi Li, University of Central Florida, Orlando, FL US*

### Session 33: Liquid Crystals for AR/VR Displays (*Augmented, Virtual and Mixed Reality / Liquid Crystal Technology*)

**Chair:** *Philip Bos, Kent State University*

**Co-Chair:** *Michael Wittek, Merck KGaA*

- 33.1: **Invited Paper:** Liquid Crystals for Virtual Reality (VR)  
*Fenglin Peng, Facebook Reality Labs Research, Redmond, WA US*
- 33.2: **Optimized Liquid Crystal Dammann Grating for Eyebox Expansion in Maxwellian View Displays**  
*Ziqian He, University of Central Florida, Orlando, FL US*
- 33.3: **True Micro-Display with 3 $\mu$ m pixel size using Deformed Helix Ferroelectric Liquid Crystal for VR/AR Displays**  
*Zhibo Sun, Hong Kong University of Science and Technology, Hong Kong, Hong Kong*
- 33.4: **Fast Switchable Multi-Focus Polarization-Dependent Ferroelectric Liquid Crystal Lenses for Virtual Reality**  
*Zhengnan Yuan, Hong Kong University of Science and Technology, Hong Kong, Hong Kong*
- 33.5: **The Fabrication Paths of Liquid Crystal Photonics for AR/VR Optical Systems**  
*Mengfei Wang, Facebook Reality Labs, Redmond, WA US*
- 33.6: **Roll-to-Plate Nanoimprint Lithography for High Volume Production of AR Glasses: Equipment, Materials, and Processes**  
*Jan Mathijs ter Meulen, Morphotonics, Veldhoven, Netherlands*

**Session 34: Color Perception and Image Quality (Applied Vision)**

**Chair:** *Kevin MacKenzie, Oculus LLC*

**Co-Chair:** *Jeffrey Mulligan, NASA Ames Research Center*

- 34.1: **Evaluating and Minimizing Color Distortion in Wide-Gamut Displays Due to Variations of Cone Fundamentals among Color-Normal Observers**  
*Lorne Whitehead, University of British Columbia, Vancouver, BC Canada*
- 34.2: **Color Correction Model Based on Spectral Distribution for solving Metameric Failure in Wide Color Gamut Displays**  
*Young Jun Seo, Samsung Display Co. Ltd., Yongin, South Korea*
- 34.3: **Visual Sensitivity to 'Perfect' Black**  
*Fu Jiang, Munsell Color Science Laboratory, Rochester, NY US*
- 34.4: **Proposal of A New Resolution Representation for Several Pixel Arrangements**  
*Ja-Eun Lee, Samsung Display, Yongin, South Korea*
- 34.5: **Adaptive Refresh Rate and Resolution: Exploiting the Limitations of Spatio-Temporal Vision**  
*Rafal Mantiuk, University of Cambridge, Cambridge, United Kingdom*

**Session 35: Capacitive Touch and Force Sensing Displays (Interactive Displays and Systems / Active Matrix Devices)**

**Chair:** *Hiroshi Haga, Tianma Japan, Ltd.*

**Co-Chair:** *Kalluri Sarma, Display Technology Consulting*

- 35.1: **Sharp Force Touch for On-Screen User Interface in LCD and Foldable OLED Display Application**  
*Takuma Yamamoto, Sharp Display Technology Corporation, Tenri, Japan*
- 35.2: **Development of IGZO UHD In-Cell Touch Panel LCD for Notebook PC**  
*Daiji Kitagawa, Sharp Display Technology Corporation, Kameyama, Japan*

**Session 36: Fingerprint Sensing Displays (Interactive Displays and Systems)**

**Chair:** *Willem den Boer, ScanVue Technologies*

**Co-Chair:** *John Zhong, Apple, Inc.*

- 36.1: **Optical Fingerprint Recognition Technology Based On Liquid Crystal Display**  
*Guiyang Zhang, China Star Optoelectronics Technology Co., Ltd., Wuhan, China*
- 36.2: **Invited Paper:** LCD Display with Integrated In-Cell Fingerprint Sensor  
*Chia-Tien Peng, AU Optronics Corporation, Hsinchu, Taiwan Roc*
- 36.3: **Microlens Collimation Film with Near-Infrared Spectral Filter for Large-Area Fingerprint Sensor**  
*Joseph Yang, 3M, St Paul, MN US*
- 36.4: **Invited Paper:** The Development of Blackened Backplane Technology for Optical Fingerprint Display  
*Jia-Hong Ye, AU Optronics Corporation, Hsinchu, Taiwan Roc*
- 36.5: **Late-News Paper:** A Novel FOD Solution with High-PPI Flexible Sensor under OLED Panel  
*Feng Lu, Shanghai Tianma Micro-electronics Co., Ltd., Shanghai, China*

**Session 37: 8k and Zero Bezel LCDs (Liquid Crystal Technology)**

**Chair:** *Jenn Jia Su, AU Optronics Corporation*

**Co-Chair:** *Linghui Rao, Facebook*

- 37.1: **Invited Paper:** Ultra Wide Color Gamut and High Luminous Efficiency LCD by Environment-Friendly Organic Material without Cadmium  
*Lei Liu, BOE Technology Group Co., Ltd., Beijing, China*
- 37.2: **Invited Paper:** 8K Zero Border LC Display  
*Ya-Ling Hsu, AU Optronics Corp., Hsinchu City, Taiwan Roc*
- 37.3: **Novel Multi-Domain Polymer Sustained Alignment LCD to Obtain High Transmittance and Wide Viewing Angles**  
*KunCheng Tien, AU Optronics Corporation, Hsinchu, Taiwan Roc*
- 37.4: **Low Off-Axis Light Leakage LCD Using New Polarizer System**  
*Masahiro Hasegawa, Sharp Display Technology Corporation, Tenri, Japan*
- 37.5: **A Study on the Design of Super Viewing Film**

Hayoung Lee, Samsung Display Co.Ltd., YongIn, South Korea

### **Session 38: Flexible & Transperent LCDs (Liquid Crystal Technology)**

**Chair:** Takahiro Ishinabe, Tohoku University

**Co-Chair:** Philip Chen, National Chiao Tung University

- 38.1: **Invited Paper: Liquid Crystal Applications in e-Paper and Security Films: New Trends**  
Vladimir Chigrinov, The Hong Kong University of Science and Technology, Hong Kong, China
- 38.2: **Invited Paper: 12.3-inch Highly Transparent LCD by Scattering Mode with Direct Edge Light and Field Sequential Color Driving Method**  
Kentaro Okuyama, Japan Display Inc., Ebina, Japan
- 38.3: **Ultra-Thin Flexible LCD Based on Single-Substrate Structure Using Novel Deformable Polarizer**  
Toru Umemoto, Nitto Denko Corporation, Osaka, Japan
- 38.4: **Improving Performance of Curved TFT-LCD with Extreme Curvature**  
Liang Yu, TCL China Star Optoelectronics Technology Co.,Ltd,Guangdong,China, Guangdong, China
- 38.5: **Waveguide Liquid Crystal Display with Light Waveguide Plate for Transparent Display**  
Yunho Shin, Kent State University, Kent, OH US
- 38.6: **Transparent Display with High-Contrast Ratio Reverse Mode PDLC**  
Mariko Honda, Sharp Display Technology Corporation, Tenri, Japan
- 38.7: **A High Reliability PEDOT:PSS/Graphene Transparent Electrode for Liquid Crystal Displays**  
Yuan Shao, TCL China Star Optoelectronics Technology Co., Ltd., Shenzhen, China

### **Session 39: Liquid Crystal Enabled Display Privacy (Liquid Crystal Technology)**

**Chair:** Koichi Miyachi, JSR Corporation

**Co-Chair:** Yukito Saitoh, FUJIFILM Corporation

- 39.1: **Invited Paper: Advanced Hyper-Viewing Angle Controllable LCD**  
Min-Hsuan Chiu, AU Optronics Corp, Hsinchu, Taiwan Roc
- 39.2: **Fast Switchable Scattering Device Based on Liquid Crystal Fibonacci Grating**  
Xinyi Yu, The Hong Kong University of Science and Technology, Hong Kong, Hong Kong

### **Session 40: Liquid Crystals for LIDAR and Eye Tracking (Liquid Crystal Technology)**

**Chair:** Dr Akihiro Mochizuki, I-CORE Technology, LLC

**Co-Chair:** Lu Lu, Facebook Reality Labs

- 40.1: **Invited Paper: New Liquid Crystal and Reactive Mesogens Mixtures for Passive and Active Photonic Components**  
Stephen Mulcahy, Merck Performance Materials Ltd., Southampton, United Kingdom
- 40.2: **Distinguished Student Paper: Compact, Fast-Response, Continuous and Wide-Angle Laser Beam Steerers**  
Ziqian He, University of Central Florida, Orlando, FL US
- 40.3: **High Light Efficiency LCD using Flip Panel Structure**  
Akira Hirai, Sharp Display Technology Corporation, Tenri, Japan

### **Session 41: HUD and Transparent Displays (Automotive/Vehicular Displays and HMI Technologies)**

**Chair:** Dr David Hermann, Volvo Car Corporation AB

**Co-Chair:** Philippe Coni, THALES Avionics

- 41.1: **Invited Paper: Dynamic Holography for Automotive Augmented-Reality Head-Up Displays (AR-HUD)**  
Jamieson Christmas, Envisics Limited, Milton Keynes, United Kingdom
- 41.2: **High Dynamic Range HUD with a Polarization Selective Optical Combiner**  
Junyu Zou, University of Central Florida, Orlando, FL US
- 41.3: **Invited Paper: Virtual Visor: Adding Intelligence to LCD Displays to Selectively Block Sunlight**  
Jason Zink, Robert Bosch LLC, Palo Alto, CA US
- 41.4: **A Novel Fully Transparent Photoluminescent Display on Vehicle Glazing and Interior Surfaces**  
Ted Sun, Sun Innovations Inc, Fremont, CA US

### **Session 42: Human Factors for Automotive Displays (Automotive/Vehicular Displays and HMI Technologies)**

**Chair:** Toshihisa Sato, AIST

**Co-Chair:** David Hermann, Volvo Car Corporation AB

- 42.1: **Invited Paper: Perceptual Quality Performance for Automotive Display Requirement**  
Don Gyou LEE, LG Display, Seoul, South Korea
- 42.2: **Distinguished Paper: Effects of Luminance Contrast and Font Size on Dual-Plane HUD Legibility (“The Double 007 Rule for HUDs”)**  
Jingyan Wan, General Motors R&D, Warren, MI US
- 42.3: **Advanced HMIs and Evaluation of Various Display Techniques for Autonomous Robots in Public Spaces**  
Karlheinz Blankenbach, Pforzheim University, Pforzheim, Germany

### **Session 43: Novel Automotive Displays (Automotive/Vehicular Displays and HMI Technologies)**

**Chair:** Karlheinz Blankenbach, Pforzheim University



**Co-Chair:** Yan Li, Shanghai Jiao Tong University

- 43.1: **Automotive Autostereoscopic 3D-Display**  
Achim Pross, Mercedes-Benz AG, Sindelfingen, Germany
- 43.2: **Automotive 48-inch Pillar-to-Pillar 8K Display**  
Diao Xiu, Wuhan China Star Optoelectronics Technology Co., Ltd., Wuhan, China
- 43.3: **Laser Assisted LED for High Output Automotive DMD Headlight**  
Kenneth Li, Optonomous Technologies Inc., Agoura Hills, CA US
- 43.4: **Late-News Paper: A Novel Smart Anti-Glare Rearview Mirror Device**  
Wenbo Li, BOE Technology Group Co., Ltd., Beijing, China

**Session 44: Touch for Automotive Displays (Automotive/Vehicular Displays and HMI Technologies)**

**Chair:** Philippe Coni, THALES Avionics

**Co-Chair:** Toshihisa Sato, AIST

- 44.1: **WITHDRAWN**
- 44.2: **In-cell Touch Panel LCD Driving Method for EMI Mitigation for Automotive Application**  
Daisuke Ito, Synaptics Japan G.K., Nakano, Japan
- 44.3: **Impact of Human Fingertip on Automotive Displays and the Quantitative Measurement on the Imperceptible Abrasion by Human Fingertip**  
Wolfgang Weinhold, Institute for Surface and Product Analysis, Wuerzburg, Germany

**Session 45: OLED and Dual-Cell HDR Displays (HDR in mini, micro LED, OLED and LCD / Display Systems / OLEDs)**

**Chair:** Brian Berkeley, Highlight Display LLC

**Co-Chair:** Shin Tson Wu, University Of Central Florida

- 45.1: **A Novel 88-inch 8K OLED Display for Premium Large-Size TVs**  
Hong Jae Shin, LG Display, Paju, South Korea
- 45.3: **Ultra High Contrast 8K Dual-Cell Display Based on IGZO Technology**  
Takehisa Yoshida, Sharp Display Technology Corporation, Kameyama, Japan
- 45.4: **Advanced Structure and Process for Dual-Cell LCD**  
Hua Huang, BOE Technology Group Co., Ltd., Beijing, China

**Session 46: Backlighting for HDR and Gaming (HDR in mini, micro LED, OLED and LCD / Display Systems / Display Manufacturing)**

**Chair:** K Käläntär, Global Optical Solutions

**Co-Chair:** Akihiro Tagaya, AT Research Laboratory

- 46.1: **Patterned Glass Diffuser (PGD) for Mini-LED Backlights**  
Xiang-Dong Mi, Corning Incorporated, Corning, NY US
- 46.2: **Ultra-Slim Direct-Lit LCD Backlight Using Glass Light Guide Plate**  
Dmitri Kuksenkov, Corning Incorporated, Corning, NY US
- 46.3: **Invited Paper: Design and Process of 2D-Backlight Beyond HDR 5000nits**  
Hajime Akimoto, Nichia Corporation, Anan, Japan
- 46.4: **High Frame Rate Scanning Backlight System For Gaming PC display with IGZO-TFT Technology**  
Masamitsu Kobayashi, Sharp Display Technology Corporation, Tenri, Japan

**Session 47: HDR & Energy Efficient LCDs (HDR in mini, micro LED, OLED and LCD / Liquid Crystal Technology)**

**Chair:** Prof. Jian Gang Lu, Shanghai Jiao Tong University

**Co-Chair:** Xibin Shao, BOE

- 47.1: **Invited Paper: High Resolution, HDR VR Displays Using Mini-LED**  
Chiu-Lien Yang, Innolux Corporation, Miaoli, Taiwan Roc
- 47.2: **Invited Paper: UBplus – A LC Display Technology Perfect for Energy Saving**  
Achim Goetz, Merck KGaA, Darmstadt, Germany
- 47.3: **Invited Paper: Development of Reflective LCDs with High Contrast Ratio and High Reflectivity**  
Ruichen ZHANG, BOE Technology Group Co., Ltd., Beijing, China
- 47.4: **Ambient Light and Human Vision Effects on High-Dynamic-Range Displays**  
En-Lin Hsiang, University of Central Florida, Orlando, FL US
- 47.5: **Distinguished Paper: Development of Reversed Dispersion Liquid Crystal Film to Improve the Display Quality of HDR-IPS Panels**  
Tatsuya Iwasaki, FUJIFILM Corporation, Minamishiga, Japan

**Session 48: 3D Holographic and Light Field Display (Display Systems)**

**Chair:** Shinichi Uehara, AGC Inc.

**Co-Chair:** Yifan (Evan) Peng, Stanford University

- 48.1: **Invited Paper: Holographic Display Based on Complex-Amplitude Encoding with Phase-Only SLMs**

- Liangcai Cao, Tsinghua University, Beijing, China*
- 48.2: **Flipping-Free Light Field Mirage Using Multiple Light Field Displays**  
*Yoshiharu Momono, Samsung R&D institute japan, Yokohama, Japan*
- 48.3: **Light Field Display Using Virtual Imaging Mode**  
*Koichiro Fukano, Tokyo University of Agriculture and Engineering, Koganei, Japan*
- 48.4: **Invited Paper: High-Resolution Integral Imaging 3D Display System**  
*Qiong-Hua Wang, Beihang University, Beijing, China*
- 48.5: **Late-News Paper: Eye-Sensing Light Field Display for Spatial Reality Reproduction**  
*Koji Aoyama, Sony Corporation, Tokyo, Japan*

### Session 49: Projection Light Sources (*Display Systems*)

**Chair:** *Hidekazu Hatanaka, Ushio Inc.*

**Co-Chair:** *Sergei Yakovenko, Apple*

- 49.1: **Invited Paper: Red, Green and Blue Laser Diodes for Display Applications**  
*Yasuaki Hirano, Sharp Fukuyama Laser Co., Ltd., Fukuyama, Japan*
- 49.2: **Invited Paper: Blue and Green VCSEL for Full Color Display**  
*Tatsushi Hamaguchi, Sony Corporation, Atsugi, Japan*
- 49.3: **High Power Laser Phosphor Light Source Using a Scanning Mirror for Projectors**  
*Kenneth Li, Optonomous Technologies Inc., Agoura Hills, CA US*

### Session 50: Projectors (*Display Systems*)

**Chair:** *David Eccles,*

**Co-Chair:** *Fujio Okumura, NEC Corporation*

- 50.1: **Omni-Directional Projection VR Systems Using Ultra-Short Throw Lenses**  
*Mariko Nishiyama, Sony Group Corporation, Atsugi, Japan*
- 50.2: **LED-Based Next Generation Immersive Virtual Reality**  
*Steffen Hergert, xCave Technology GmbH, Ditzingen, Germany*
- 50.3: **Novel Brightest Rear Projection Type Transparent Screen Using Tilted Cholesteric Liquid Crystals**  
*Hirofumi Toyama, FUJIFILM Corporation, Minamiashigara, Japan*
- 50.4: **Optical Design of Corner-Cube Retroreflectors with Inclined Curved Optical Surfaces for Directional Scattering Projector Screen**  
*K Kälántár, Global Optical Solutions, Hachioji, Japan*

### Session 51: Display Performance Measurement I (*Display Measurement*)

**Chair:** *Thomas Fiske, Microsoft*

**Co-Chair:** *Frank Rochow, Adviser*

- 51.1: **Invited Paper: The International Commission on Illumination (CIE) and Aspects of Measurement Uncertainty in Photometry**  
*Peter Blatner, Metas, Berne-Wabern, Switzerland*
- 51.2: **Distinguished Paper: Measuring Color Capability of Wide Color Gamut Near-Eye Displays**  
*John Penczek, NIST and University of Colorado, Boulder, Boulder, CO US*
- 51.3: **Color Shifting in High Dynamic Range OLED Displays**  
*Ioannis Kymissis, Columbia University, New York, NY US*

### Session 52: Display Performance Measurement II (*Display Measurement*)

**Chair:** *Michael Becker, Display-Metrology & Systems*

**Co-Chair:** *Udo Krueger, TechnoTeam*

- 52.1: **Blue Light Eye Safety Predictions Under Ambient Light: ePaper Displays with Front Light vs. Emissive Displays**  
*Dirk Hertel, E Ink Corporation, Billerica, MA US*
- 52.2: **Research on Evaluation Method of Display Visual Effect**  
*Hongwei Zhao, TianMa Microelectronics Co., Ltd., XiaMen, China*
- 52.3: **A Quantitative Method for L0 Leakage Sensitivity of TFT-LCD Based on JND Energy Ratio**  
*Han Yan Sun, Beijing BOE Display Technology Co., Ltd., Beijing, China*
- 52.4: **Late-News Paper: Simulation of Dynamic MTF Measurement Method for Pixelated Displays**  
*Kenichiro Masaoka, NHK Science and Technology Research Laboratories, Tokyo, Japan*

### Session 53: Display Reflectance and Performance Analysis (*Display Measurement / Automotive/Vehicular Displays and HMI Technologies*)

**Chair:** *Stephen Atwood, Consultant*

**Co-Chair:** *David Hermann, Volvo Car Corporation AB*

- 53.1: **Reflection Measurements in ISO TC159 SC4 WG2 and IEC TC110**  
*Michael Becker, Display-Messtechnik & Systeme, Rottenburg, Germany*
- 53.2: **Directional Variations of Specular Reflections from Displays**  
*Michael Becker, Display-Messtechnik & Systeme, Rottenburg, Germany*
- 53.3: **Dynamic Crosstalk Measurement for Augmented Reality 3D Head-Up Display (AR 3D HUD) with Eye-Tracking**  
*Byongmin Kang, Samsung Electronics, Suwon, South Korea*

- 53.4: **Distinguished Paper:** Short Distance Uniformity and BlackMURA Measurements  
Ingo Rotscholl, TechnoTeam Bildverarbeitung GmbH, Ilmenau, Germany

### Session 54: Emerging Displays and Components (Emerging Technologies and Applications)

**Chair:** Susan Jones, Nulumina Corp.

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

- 54.1: **Invited Paper:** Stretchable Display in the Era of the 4th Industrial Revolution  
Sunchan Jo, Samsung Display Co. Ltd., Yongin, South Korea
- 54.2: **Displays with Integrated Microcamera Arrays For Image Capture and Sensing**  
David Slobodin, IdeaFarm LLC, Lake Oswego, OR US
- 54.3: **A Full-Color Decorative Display Integrated with Anti-Reflection Film**  
Jing Wang, BOE Technology Center, Beijing, China
- 54.4: **A 142-inch IGZO TFT Glass-Substrated AM MiniLED Tiled Display with External Compensation and Multi-Layer Demura Algorithm**  
Yingdong Huo, TCL China Star Optoelectronics Technology Co. Ltd., Shenzhen, China
- 54.5: **Vertically and Inclinedly Oriented Polarizers for Viewing Angle Control**  
Shinya Watanabe, FUJIFILM Corporation, Kanagawa, Japan
- 54.6: **Late-News Paper:** Holographic 3D Telepresence System with Light Field 3D Displays and Depth Cameras over a LAN  
Christopher Blackwell, Heriot Watt University, Edinburgh, United Kingdom

### Session 55: Emerging Electronics (Emerging Technologies and Applications)

**Chair:** Vincent Gu, Apple, Inc.

**Co-Chair:** Bao-Jen Pong, Industrial Technology Research Institute

- 55.1: **Invited Paper:** Beyond Flexible Towards Sustainable Electronics  
Liisa Hakola, VTT Technical Research Centre of Finland Ltd., Espoo, Finland
- 55.2: **Invited Paper:** Nanomesh Based On Skin Electronics  
Tomoyuki Yokota, The University of Tokyo, Tokyo, Japan
- 55.3: **Invited Paper:** Flexible Hybrid Electronics Using Display Infrastructure  
Steve Chiu, Industrial Technology Research Institute (ITRI), Hsinchu, Taiwan Roc

### Session 56: Novel Sensing Devices (Emerging Technologies and Applications)

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

**Co-Chair:** Timothy Large, Microsoft Corp

- 56.1: **Enhancing Response Time of Quantum-Dot-Based TFT Photosensor with Self-Assembled Monolayer**  
Yoonyoung Chung, POSTECH, Pohang, South Korea
- 56.2: **Distinguished Student Paper:** Polarization Independent Liquid Crystal-Based Refractive Index Sensor  
Zhiyong Yang, University of Central Florida, Orlando, FL US
- 56.3: **An Amplifier with Higher Gain Using Corbino –TFTs**  
Seung-Woo Lee, Kyung Hee University, Seoul, South Korea
- 56.4: **Design of a Transparent Dielectric Metamirror for Micro LED Displays**  
Khaled Ahmed, Intel Corporation, San Jose, CA US
- 56.5: **Image Sensor Using IGZO TFT Backplane with the Sacrificial Barrier Layer for X-Ray Detector**  
Xiangmi Zhan, Beijing BOE Sensor Technology Co., Ltd., Beijing, China
- 56.6: **Late-News Paper:** A Wearable Self-Driven Piezoelectric Sensor Enabling Real-Time Blood Pressure Estimation  
Kai Wang, Sun Yat-Sen University, Guangzhou, China

### Session 57: IoT Displays (IoT Displays / Emerging Technologies and Applications / Display Systems)

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

**Co-Chair:** Khaled Ahmed, Intel Corporation

- 57.1: **Trends in Low Cost Displays for Emerging Applications**  
Matthew Dyson, IDTechEx, Cambridge, United Kingdom
- 57.2: **Glass-Embedded Electromagnetic Surface for Energy-Saving Future Wireless Communication**  
Byoungwan Kang, Corning Technology Center Korea, Asan, South Korea
- 57.3: **Invited Paper:** Diversification of Processing Requirements for Large Format IoT Displays: 8K, Programmatic and LED Walls  
Ben Cope, Intel Corporation, Swindon, United Kingdom
- 57.4: **Invited Paper:** Imperceptible Electronics for Digital Transformation  
Tsuyoshi Sekitani, Osaka University, Ibaraki, Japan

### Session 58: Micro LED Display Metrology (Emissive, Micro-LED, and Quantum-Dot Displays)

**Chair:** Dr. Khaled Ahmed, Intel Corporation

**Co-Chair:** Ioannis Kymissis, Columbia University

- 58.1: **Invited Paper:** Overcoming the Challenges in microLED Inspection and Manufacturing  
David Lewis, CEO, InZiv, Jerusalem, Israel
- 58.2: **Invited Paper:** Cost Effective Probing in High Volume Manufacture of  $\mu$ LEDs  
Matthew Davies, Atolight AG, Lausanne, Switzerland

- 58.3: **Invited Paper:** Color Uniformity of  $\mu$ LED Displays: New Color Calibration Concept for Fast and Accurate Optical Testing  
Tobias Steinel, Instrument Systems GmbH, Munich, Germany

### Session 59: Micro-LED Manufacturing I (Emissive, Micro-LED, and Quantum-Dot Displays / Display Manufacturing)

**Chair:** Kevin Gahagan, Corning Incorporated

**Co-Chair:** Ion Bitu, Google LLC

- 59.1: **Invited Paper:** From the Lab to the Fab: Challenges and Requirements for High Volume MicroLED Manufacturing Equipment  
Eric Virey, Yole Developpement, Portland, OR US
- 59.2: **Laser Reflow Soldering Technique for Mini/Micro-Led Display**  
Chuhang Wang, BOE Technology Group Co., Ltd., Beijing, China
- 59.3: **Ultra-Precise Printing of Micrometer-Size Interconnectors for High-Resolution Micro-LED Displays**  
Piotr Kowalczewski, XTPL SA, Wroc?aw, Poland
- 59.4: **A New Method of Side-Wiring Bonding and Patterning for Micro-LED Display on Glass Substrate**  
Yong Lian Qi, Beijing BOE Display Technology Co., Ltd., Beijing, China
- 59.5: **Late-News Paper:** Simultaneous Transfer and Bonding (SITRAB) Process for Mini-LED Display  
Kwang-Seong Choi, Electronics Telecommunications Research Institute, Daejeon, South Korea
- 59.6: **Late-News Paper:** Directed Electrostatic MicroAssembly for MicroLED Display  
Eugene Chow, PARC, a Xerox Company, Palo Alto, CA US

### Session 60: Micro-LED Manufacturing II (Emissive, Micro-LED, and Quantum-Dot Displays Displays / Display Manufacturing)

**Chair:** Qun Yan, Fuzhou University

**Co-Chair:** Kevin Gahagan, Corning Incorporated

- 60.1: **Invited Paper:** Mass Transfer Throughput and Yield Using Elastomer Stamps  
Chris Bower, X Display Company, Raleigh, NC US
- 60.2: **Contact Model Analysis of GaN-based Micro Light Emitting Diodes (Micro-LEDs) With Distinct Structures and Bonding Pads**  
Yibo Liu, Hong Kong University of Science and Technology, Hong Kong, China
- 60.3: **Invited Paper:** Borderless Tiling MicroLED Pixel Matrix Display  
Ying-Tsang (Falcon) Liu, PlayNitride Display Co., Ltd., Miaoli County, Taiwan Roc
- 60.4: **A Micro LED Device with 0mm Border**  
TENGGANG LOU, Tianma Micro-Electronics Group, Shanghai, China
- 60.5: **Invited Paper:** Display Technology Responds to COVID-19 Challenges  
Seth Coe-Sullivan, NS Nanotech, Redondo Beach, CA US

### Session 61: Micro-LEDs (Emissive, Micro-LED, and Quantum-Dot Displays)

**Chair:** Chris Bower, X Display Company

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

- 61.1: **Heuristics of OLED and Micro LED Efficiencies**  
Khaled Ahmed, Intel Corporation, San Jose, CA US
- 61.2: **A Novel Micro-LED Pixel Circuit Using n-type LTPS TFT with Pulse Width Modulation Driving**  
Yong-Hoo Hong, Sungkyunkwan University, Suwon, South Korea
- 61.3: **Investigation of AlGaIn-based Deep-UV Micro-LED as Highly Efficient Excitation Source for Green Perovskite Quantum Dots Display**  
Feng Feng, Hong Kong University of Science and Technology, Hong Kong, Hong Kong
- 61.4: **A New Pixel Circuit Based on LTPO Backplane Technology for Micro-LED Display Using PWM Method**  
Eun Kyo Jung, Sungkyunkwan University, Suwon, South Korea
- 61.5: **Late-News Paper:** Fully Monolithic GaN  $\mu$ LED Display System  
Matthew Hartensveld, Innovation Semiconductor, Inc., Rochester, NY US

### Session 62: Quantum Dot Color Conversion (Emissive, Micro-LED, and Quantum-Dot Displays)

**Chair:** John Van Derlofske, 3M

**Co-Chair:** Juanita Kurtin, OSRAM Opto Semiconductors

- 62.1: **High-Resolution Quantum Dot Photoresist for Full-Color  $\mu$ -LED Microdisplays**  
Ray-Kuang Chiang, Far East University, Tainan, Taiwan Roc
- 62.2: **Flexible Full Color Active Matrix Quantum Dot OLED Display**  
Wei Huang, BOE Technology Group Co., Ltd., Beijing, China
- 62.3: **Red Perovskite Emitters for Color Conversion and LEDs**  
Bernard Wenger, Helio Display Materials Ltd, Oxford, United Kingdom
- 62.4: **Distinguished Student Paper:** Doubling the Optical Efficiency of Color-Converted Micro-LED Displays with a Patterned Cholesteric Liquid Crystal Polymer Film  
En-Lin Hsiang, University of Central Florida, Orlando, FL US
- 62.5: **Efficient On-Chip Quantum Rod LED with Supreme Stability for Display and Lighting Application**  
Chengbin Kang, The Hong Kong University of Science and Technology, Hong Kong, Hong Kong
- 62.6: **Invited Paper:** Narrow-Band Phosphors for Next Generation MiniLED and MicroLED Displays

*James Murphy, GE Research, Niskayuna, NY US*

- 62.7: **Invited Paper: Quantum Dot Color Conversion for OLED and microLED Displays**  
*Ravi Tangirala, Nanosys Inc, Milpitas, CA US*
- 62.8: **Invited Paper: High Color Gamut QDot™ LCD Displays with Perovskite Quantum Dots: Devices Architecture, Performance and Reliability**  
*Marat Lutfullin, Quantum Solutions, Southampton, United Kingdom*
- 62.9: **Invited Paper: Hybrid Composite Films with Perovskite Quantum Dots and Red Phosphors for LCD Display Backlights**  
*Haizheng Zhong, Beijing Institute of Technology, Beijing, China*
- 62.10: **Invited Paper: How to Further Extend the Image Quality Lead of LCD Displays**  
*Norman Lüchinger, Avantama AG, Stafa, Switzerland*
- 62.11: **Late-News Paper: Development of New Green Phosphors for Liquid Crystal Display Backlights**  
*Sam Camardello, GE Licensing, Niskayuna, NY US*

### **Session 63: Quantum Dot Displays I (Emissive, Micro-LED, and Quantum-Dot Displays)**

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

**Co-Chair:** *Chang Hee Lee, Samsung Display Corporation*

- 63.1: **Invited Paper: High Performance Top Emission Quantum-Dot Light-Emitting Devices**  
*Yixing Yang, TCL Research, Shenzhen, China*
- 63.2: **Thin-film Compatible Process High Resolution Patterning of Quantum Dots**  
*Pai Liu, Southern University of Science and Technology, Shenzhen, China*
- 63.3: **Low-Color-Shift QD-LED Pixels with Uniform Layer Thicknesses**  
*David Montgomery, Sharp Laboratories of Europe, Oxford, United Kingdom*
- 63.4: **Late-News Paper: Development of Ink-jet Printing Process for 55-inch UHD AMQLED Display**  
*Tieshi Wang, BOE Technology Group Co., Ltd., Beijing, China*

### **Session 64: Quantum Dot Displays II (Emissive, Micro-LED, and Quantum-Dot Displays)**

**Chair:** *Chang Hee Lee, Samsung Display Corporation*

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

- 64.1: **Invited Paper: Challenges for Realizing QD-LED display**  
*Masayuki Kanehiro, Sharp Display Technology Corporation, Tenri City, Japan*
- 64.2: **ELQD Performance Modeling**  
*Michal Mlejnek, Corning Incorporated, Corning, NY US*
- 64.3: **Invited Paper: High Optical Density Quantum Dot Pixel Color Conversion Films for Displays**  
*Yu Kambe, NanoPattern Technologies, Chicago, IL US*

### **Session 65: Quantum Dot LED (QD-LED) Devices (Emissive, Micro-LED, and Quantum-Dot Displays)**

**Chair:** *Michele Ricks, EMD Performance Materials*

**Co-Chair:** *Xiao Wei Sun, Southern University of Science and Technology*

- 65.1: **Invited Paper: Heavy-Metal-Free Electroluminescent Devices Based on Quantum Dots with Quasi-Cubic Morphology**  
*Diego Barrera, Nanosys Inc., Milpitas, CA US*
- 65.2: **Red Electroluminescence Quantum Dot Devices (EL-QD) with Improved Efficiency and Lifetime**  
*Myoungjin Park, Samsung Display Co., Ltd., Yongin, South Korea*
- 65.3: **Quantum Dot Light-Emitting Diodes with High Color Purity RGB Cadmium-Free Quantum Dots.**  
*Tatsuya Ryowa, Sharp Corporation, Tenri, Japan*
- 65.4: **Investigation of Blue Quantum-Dot Light-Emitting Diode with Positive Aging Treatment**  
*Jiun-Haw Lee, National Taiwan University, Taipei, Taiwan Roc*
- 65.5: **Improved Brightness and Efficiency of Green Quantum Rod Based Light Emitting Diodes**  
*Kumar Mallem, The Hong Kong University of Science and Technology, Hong Kong, Hong Kong*
- 65.6: **Control of Oxygen Vacancy in ZnO Nanoparticles Electron Transport Layer by Intense-Pulsed Light Post-Treatment Under Fabrication of Ink-jet Printed Quantum-Dot Light-emitting Diodes**  
*Kwan Hyun Cho, Korea Institute of Industrial Technology (KITECH), Ansan, South Korea*
- 65.7: **Cd-Free Quantum-Dot Light-Emitting Diode with a Mixed Single Layer to improve the Flatness of Current Efficiency**  
*Mohammad Mostafizur Biswas, University of Toyama, Toyama, Japan*
- 65.8: **Late-News Paper: Transparent Electroluminescent QLEDs with High Brightness Double-Side-Emission Fabricated in Atmosphere.**  
*Hsueh-Shih Chen, National Tsing Hua University, Hsinchu, Taiwan Roc*

### **Session 66: Quantum Dot Photodetector Technology (Emissive, Micro-LED, and Quantum-Dot Displays)**

**Chair:** *Larry Weber, Consultant*

**Co-Chair:** *Yajie Dong, University of Central Florida*

- 66.1: **High Resolution Quantum Dot Global Shutter Imagers**  
*Jonathan Steckel, ST Microelectronics, Grenoble, France*
- 66.2: **Invited Paper: QD-Based Sensors for Infrared Imaging**  
*Pawel Malinowski, imec, Leuven, Belgium*
- 66.3: **Invited Paper: Colloidal QD Photodetectors for Large Format NIR, SWIR, and Extended SWIR Sensor Arrays**  
*Ethan Klem, SWIR Vision Systems, Durham, NC US*



- 66.4: **Invited Paper:** Graphene Enhanced QD Image Sensor Technology  
Tapani Ryhänen, CTO, Espoo, Finland
- 66.5: **Invited Paper:** Colloidal Quantum Dots: A Material Platform for Highly Sensitive Photodetectors and High Quantum Efficiency Light Emitters in the SWIR  
Gerasimos Konstantatos, ICFO, Castelldefels, Spain

### Session 67: E-Paper (Flexible Displays and E-paper)

**Chair:** Makoto Omodani, Tokai University

**Co-Chair:** Ze Yuan

- 67.1: **Invited Paper:** Full-Color Electrophoretic Displays with Improved Update Time  
Michael McCreary, E Ink Corporation, Billerica, MA US
- 67.2: **Color E-Paper: Current Performance and Achievable Goals**  
Alex Henzen, South China Normal University, Guangzhou, China
- 67.3: **Invited Paper:** Progress in Electronic Paper Displays: Color Video Electrofluidic Display Technology  
Guofu Zhou, South China Normal University, Guangzhou, China
- 67.4: **Late-News Paper:** Shutter-Free Full Colour Solid State Reflective Display (SRD®)  
Peiman Hosseini, Bodle Technologies, Oxford, United Kingdom
- 67.5: **Late-News Paper:** Utility of Dual Screen e-Paper for Writing Using Reference Documents  
Makoto Omodani, Tokyo Denki University, Hiki-gun, Saitama, Japan

### Session 68: Foldable and Rollable Displays I (Flexible Displays and E-paper)

**Chair:** Kyung Cheol Choi, KAIST

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

- 68.1: **Extremely Robust Rollable AMOLED Display**  
Taewoong Kim, Samsung Display, Yongin, South Korea
- 68.2: **Optimization Analysis of Rollable Shape and Stack Design for Rollable AMOLED Display by Finite Element Analysis**  
Xiaofei Luo, BOE Technology Group Co., LTD., Beijing, China
- 68.3: **Ultra-Thin Metal-Based Film Anti-Reflection for Foldable/Rollable OLED Displays**  
Hejin Wang, BOE Technology Group Co., Ltd., Beijing, China
- 68.4: **A New Thin-Film Encapsulation Structure for Flexible OLED Display with Long Lifetime**  
Tao Wang, BOE Technology Group Co., Ltd., Beijing, China

### Session 69: Foldable and Rollable Displays II (Flexible Displays and E-paper)

**Chair:** Simon Kang, Apple

**Co-Chair:** Seung-Yong Song, Samsung Display

- 69.1: **Invited Paper:** Integrated Cover Window for Foldable Displays  
chen kuan Kuo, Benq Materials, Taoyuan, Taiwan Roc
- 69.2: **The Development of the Flexible Cover Window for the Large-Sized Foldable Display with a Pen Touch Function**  
Youngjoo Park, LG Display, Seoul, South Korea
- 69.3: **Non-Linear Mechanics of Adhesives for Robust Flexible Displays**  
Joel Abrahamson, 3M, Saint Paul, MN US

### Session 70: Flexible Displays and Sensors (Flexible Displays and E-paper)

**Chair:** Meng-Ting Lee, Huawei Technologies Co.

**Co-Chair:** Hajime Yamaguchi, Visionox Technology Inc.

- 70.1: **Distinguished Paper:** 9.4-inch 228-ppi Flexible Micro LED Display  
Seok-Lyul Lee, AU Optronics, Hsinchu, Taiwan Roc
- 70.2: **Invited Paper:** Sheet-Type Image Sensor with Near Infrared Sensitive Organic Photodiode  
Tomoyuki Yokota, The University of Tokyo, Tokyo, Japan
- 70.3: **Flexible Reflective Liquid Crystal Display Technology**  
Ming Xie, Shanghai Tianma Microelectronics, Shanghai, China

### Session 71: Stretchable Display and Technology (Flexible Displays and E-paper)

**Chair:** Yong Taek Hong, Seoul National University

**Co-Chair:** CC Lee, ITRI

- 71.1: **Invited Paper:** Skin-Inspired Electronics for Emerging Display Technology  
Zhenan Bao, Stanford University, Stanford, CA US
- 71.2: **Enabling Processes and Designs for Tight-Pitch Micro-LED Based Stretchable Display**  
Jiahao Kang, Royole Corporation, Fremont, CA US

## Poster Session

### Active Matrix Devices

- P.1:** **World's First 85-in. 8K4K 120Hz 1G1D LCD with Oxide TFT Using Four-Mask Array Process**  
*Shi-Min Ge, Shenzhen China Star Optoelectronics Technology Co., Ltd., Shenzhen, China*
- P.2:** **High Performance LTPO TFT-LCD using Metal as Hydrogen Barrier Layer**  
*Chengzhi Luo, Wuhan China Star Photoelectric Technology Co., Ltd., Wuhan, China*
- P.3:** **LTPS Device and Panel Fabrication using Excimer Laser Dehydrogenation and Crystallization**  
*Jin Sung Kim, LG Display Co., Paju, South Korea*
- P.4:** **Novel Oxide Semiconductors Enabling as High On-State Current as LTPS**  
*Toshimitsu Obonai, Semiconductor Energy Laboratory Co., Ltd., Tochigi, Japan*
- P.5:** **New Capacitive Active Pixel Sensor Based on LTPS TFT Backplane Technology for Fingerprint Recognition**  
*Dexi Kong, Beijing BOE Sensor Technology Co., Ltd., Beijing, China*
- P.6:** **Reduction of Drain Current Drop Phenomenon in BCE a-IGZO TFTs for 85-inch 8K 120Hz GOA LCD**  
*Zeke Zheng, Shenzhen China Star Optoelectronics Technology Co., Ltd., Shenzhen, China*
- P.7:** **In-Cell Touch Display Design Using Gate Driver Circuits Integrated within Active Area and De-Mux Source Driver**  
*Chao Tian, Wuhan China Star Optoelectronics Technology Co., Ltd, Wuhan, China*
- P.8:** **A Novel Design of Pixel Driver Circuit with Boost Function for UWFR Display**  
*Hai Ming Cao, Wuhan China Star Photoelectric Technology Co., Ltd., Wuhan, China*
- P.9:** **Understanding Diffusion Behaviors of Light Element in OLEDs**  
*Jae Bum Han, Samsung Display, Asan, South Korea*
- P.10:** **WITHDRAWN**
- P.11:** **Self-Heating Induced Degradation in a Metal-Oxide Thin-Film Transistor on a Flexible Substrate and Its Mitigation**  
*Zhihe XIA, The Hong Kong University of Science and Technology, Hong Kong, China*
- P.12:** **Activation of IGZO Devices at 150 °C via Reduction Process Using Hydrogen Gas During Sputtering**  
*Yusaku Magari, Shimane University, Matsue, Japan*
- P.13:** **IGZO TFT Pixel Circuits Compensating Threshold Voltage and Mobility Variations in AMOLED Displays**  
*Yingtiao Xie, Chongqing University of Posts and Telecommunications, Chongqing, China*
- P.14:** **Optical Sensor with New Driving Method Using Amorphous Silicon Thin-Film Transistors to Increase Three Types of Sensed Light for Large-Sized Interactive Display**  
*Chih-Lung Lin, Department of Electrical Engineering, National Cheng Kung University, Tainan, Taiwan Roc*
- P.15:** **Reliable Gate Driver for Real-time External Compensated AMOLED Display Using InGaZnO TFTs**  
*Jiwen Yang, Peking University, Shenzhen, China*
- P.16:** **Turnaround Phenomenon of Threshold Voltage Shifts in Bias-Stressed a-Si:H Thin Film Transistor under Extremely High Intensity Illumination**  
*Chunming Liu, Shenzhen China Star Optoelectronics Technology Co., Ltd., Shenzhen, China*
- P.17:** **Design of AMOLED Pixel Circuit Using LTPO TFTs with Enhanced Reliability**  
*Jia Fu, Peking University, ShenZhen, China*
- P.18:** **Non-Oxidizing Pre-Annealing for Enhanced Fluorination of an Indium-Gallium-Zinc Oxide Thin-Film Transistor**  
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- P.19:** **Enhanced Elevated-Metal Metal Oxide Thin-Film Transistors for Gate-Driver Circuit Fabricated on a Flexible Substrate**  
*Runxiao Shi, The Hong Kong University of Science and Technology, Hong Kong, China*
- P.20:** **32-inch 8K4K 120Hz LCD with LTPS TFT**  
*Chu-Kuan Yu, AU Optronics Corp., Hsinchu City, Taiwan Roc*
- P.21:** **A Low-Power Transflective TFT-LCD Based On IGZO TFT**  
*TENGGANG LOU, Tianma Micro-Electronics Group, Shanghai, China*
- P.22:** **Flexible La Doped ZnO TFTs and Circuits on Polyimide Substrate for Foldable Display**  
*Jin Jang, Kyung Hee University, Seoul, South Korea*
- P.110:** **Late-News Poster: Spontaneous Direct Printing Method for Solution-Processed Metal Oxide Thin-Film Transistors**  
*Masashi Miyakawa, NHK Science & Technology Research Laboratories, Tokyo, Japan*

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- P.23:** **Image Adaptation to Human Vision (Eyeglasses free): Full Visual Corrected Function in Light Field Near to Eye Displays**  
*Jui-Yi Wu, Coretronic Corporation, Hsinchu, Taiwan Roc*
- P.24:** **Evaluation Method of SMV Crosstalk Based on Human Visual Characteristic**  
*Sen Ma, BOE, Beijing, China*
- P.25:** **A Light-Field Near-Eye Display with Time and Color Multiplexing**  
*Hideki Kakeya, University of Tsukuba, Tsukuba, Japan*
- P.26:** **IoT Display-based Non-Face-to-Face Visual Experiment Method for Preferred Color Temperature under Varying Ambient Lights**  
*Jae Sung Park, Samsung Electronics, Suwon, South Korea*
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*Jiaxin Li, BOE, Beijing, China*

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*Deniz Yaralioglu, CY Vision, San Jose, CA US*
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*Man Yuan, BOE Optoelectronics Technology Co., Ltd., Chengdu, China*
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*Jian Tao, Wuhan China Star Optoelectronics Technology Co., Ltd., Wuhan, China*
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*Lihua Geng, BOE Technology Group Co., Ltd., Beijing, China*
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*Chih-Wen Lu, National Chiao Tung University, Tainan, Taiwan Roc*
- P.118: *Late-News Poster*: A 10-Bit Active-Matrix Display Driver for Passive-Matrix Liquid Crystal Displays**  
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*Xiaohua Li, Wuhan China Star Optoelectronics Technology Co., Ltd., Wuhan, China*
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*Wanda Walczak, Corning Incorporated, Corning, NY US*
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*Zhang Bing, BOE Optoelectronics Technology Co., Ltd., Hefei, China*
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*Yang Feng, Southern University of Science and Technology, Shenzhen, China*
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*Chen-Hui Lee, FocalTech Systems CO., Ltd., Hsinchu, Taiwan Roc*
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*Jie miao, TCL China Star Optoelectronics Technology Co., Ltd., Shenzhen, China*
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*Qian Deng, Wuhan China Star Optoelectronics Technology Co., Ltd., Wuhan, UNK China*
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*Qian Yang, University of Central Florida, Orlando, FL US*
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*Peng Hao Gu, BOE Technology Group Co., Ltd., Beijing, China*
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*Min Chul Suh, Kyung Hee University, Seoul, South Korea*
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*Rossa Mc Ciarnáin, imec, Leuven, Belgium*