ADVANCE PROGRAM

2022 DISPLAY WEEK INTERNATIONAL SYMPOSIUM

May 10-13, 2022 (Tuesday – Friday)
San Jose McEnery Convention Center
San Jose, California, US

Session 1: Annual SID Business Meeting
Tuesday, May 10, 2022 / 8:00 – 8:20 am / Room 220A

Session 2: Opening Remarks / Keynote Addresses
Tuesday, May 10, 2022 / 8:20 – 10:20 am / Room 220A
Chair: *Ruiqing (Ray) Ma, Nanosys*

2.1: ***Keynote Address 1:*** *The New Normal and Displays, Soo-Young Yoon, LG Display Co., Ltd.*
2.2: ***Keynote Address 2:*** *Displays for AR/VR: Challenges and Trends, Joseph O'Keeffe, Meta*
2.3: ***Keynote Address 3:*** *Empowering IoT with Displays — the Future and the Pathways, Xiaguoang Xu, BOE Technology Group Co., Ltd.*

Session 3: QD-LEDs I *(Emissive, Micro-LED, and Quantum-Dot Displays)*
Tuesday, May 10, 2022 / 11:10 AM - 12:30 PM / Room 220C
Chair: *Norman Bardsley, Bardsley Consulting*
Co-Chair: *Jonathan Steckel, ST Microelectronics*

3.1: ***Invited Paper:*** **Failure Mechanism of Cadmium-Based Blue Quantum Dot Light-Emitting Diodes by using Electrochemical Impedance Spectroscopy and Stabilization of Core-Shell ZnO Nanoparticles**
Baek Kim, NanoPhotonica, Gainesville, FL US

3.2: **Analyzing the Degradation Process of Quantum-Dot LEDs (QLEDs) by Mass Spectrometry**
Hinwai Mo, Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera), Fukuoka, Japan

3.3: ***Distinguished Paper:*** **All Inkjet-Printed RGB Cd-Free EL-QD Devices with Top-Emission Structure**
Myoungjin Park, Samsung Display Co., Ltd., Yongin, South Korea

3.4: **Highly Efficient Green Top-Emission Light-Emitting Diodes Based on Indium Phosphide Quantum Dot**
Di Zhang, BOE Technology Group Co., Ltd., Beijing, China

Session 4: Oxide TFTs for OLED Displays *(Active Matrix Devices)*
Tuesday, May 10, 2022 / 11:10 AM - 12:10 PM / Room LL21CD
Chair: *Mike Hack, Universal Display Corporation*
Co-Chair: *Yusin Lin, Applied Materials, Inc.*

4.1: **Development of Ultra-Large 95inch 8K 120Hz OLED Display**
Zhongyuan Wu, Hefei BOE Joint Technology Co., Ltd., Hefei, China

4.2: **High Performance, Coplanar Polycrystalline InGaO Thin Film Transistor for Large Area, High Resolution AMOLED Display**
Jin Jang, Kyung Hee University, Seoul, South Korea

4.3: ***Invited Paper:*** **High Mobility Oxide Thin-Film Transistors for AMOLED Displays**
Joon Seok Park, Samsung Display, Inc., Yongin, South Korea

Session 5: Advanced Compensation Techniques *(Display Electronics)*
Tuesday, May 10, 2022 / 11:10 AM - 12:10 PM / Room LL21EF
Chair: *Taesung Kim, Google LLC*
Co-Chair: *Soo-Yeon Lee, Seoul National University*

5.1: **Implementation of Full-Panel Circuit Models for Interference Estimation Between Touch and Display Operation in On-Cell Touch AMOLED**
Seung-Hun Choi, Korea University, Seoul, South Korea

5.2: **Tracing-Based Degradation Estimation Method for Stress Profile Algorithm**
Seokha Hong, Samsung Display, Yongin, South Korea

5.3: **A Random Access Gate Driver Using a-IGZO TFTs for External Compensation of High-Resolution, High-Frame-Rate AMOLEDs**
Byong-Deok Choi, Hanyang University, Seoul, South Korea

Session 6: AR/MR - LC Optics and Displays *(Liquid Crystal Technology)*
Tuesday, May 10, 2022 / 11:10 AM - 12:10 PM / Room LL20BC
Chair: *Lu Lu, Facebook Reality Labs*
Co-Chair: *Shin Tson Wu, University Of Central Florida*

6.1: ***Invited Paper:*** **Tutorial on Diffractive Liquid Crystal Devices for AR/VR Displays**
Shin-Tson Wu, University of Central Florida, Orlando, FL US

6.2: ***Invited Paper:*** **High-PPI Fast-Switch Display Development for Oculus Quest 2 VR Headsets**
Cheonhong Kim, Meta, Sunnyvale, CA US

Session 7: Under Display Camera Systems *(Interactive Displays and Systems / Display Electronics / OLEDs)*
Tuesday, May 10, 2022 / 11:10 AM - 12:50 PM / Room LL20A
Chair: *Jongseo Lee, Google*

Co-Chair: *Martin Grunthaner, Apple*

7.1: ***Invited Paper:*** **UDC Technology for OLED Display**
Junhui Lou, Visionox Technology Inc., Kunsan, China

7.2: **High Transmittance Under-Display Camera Structure with COE**
Chuanxiang Xu, BOE, Beijing, China

7.3: **OLED Camera-Under Panels with Improved Imaging Quality**
Lei Wang, Wuhan Tianma Microelectronics, Wuhan, China

7.4: **Correction Algorithm for Under-Display Camera Area on AMOLED Display**
Shang-Yu Su, Novatek Microelectronics Corporation, Hsinchu, Taiwan Roc

7.5: **Synthetic Dataset for Improving UDC Video Restoration Network Performance**
Hyunjoo Hwang, Samsung Display, Youngin, South Korea

Session 8: QD-LEDs II *(Emissive, Micro-LED, and Quantum-Dot Displays)*

Tuesday, May 10, 2022 / 2:00 PM - 3:40 PM / Room 220C

Chair: *Jean-Jacques Drolet, Osram Opto Semiconductors*

Co-Chair: *Jonathan Steckel, ST Microelectronics*

8.1: ***Invited Paper:*** **Development of High Efficiency QLED Technology for Display Applications**
Yanzhao Li, BOE Technology Group Co., Ltd., Beijing, China

8.2: ***Invited Paper:*** **Development of Active-Matrix nanoLED Display Using Heavy Metal Free QDs Patterned by Photolithography Process**
Yohei Nakanishi, Sharp Display Technology Corporation, Nara, Japan

8.3: **Development of Highly Efficient RGB Cadmium-Free Quantum Dot Light-Emitting Diodes**
Tatsuya Ryowa, Sharp Corporation, Tenri, Japan

8.4: **Degradation Analysis of InP-Quantum Dot Light-Emitting Diodes**
Raju Lampande, Kyung Hee University, Seoul, South Korea

8.5: **Inkjet-Printed Quantum Dot/Organic Semiconductor Nanohybrids for Efficient InP-Based Quantum Dot Light-Emitting Diodes**
Yohan Kim, Fraunhofer Institute for Applied Polymer Research (IAP), Potsdam, Germany

Session 9: High Performance TFT Sensors *(Active Matrix Devices / Emerging Technologies and Applications)*

Tuesday, May 10, 2022 / 2:00 PM - 3:20 PM / Room LL21CD

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

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

9.1: **Evaluation of X-Ray Resistance of Submicron-Size c-Axis Aligned Crystalline Oxide Semiconductor**
Kazuki Tsuda, Semiconductor Energy Laboratory Co., Ltd., Atsugi, Japan

9.2: **Oxide TFT Behavior Under X-ray Irradiation in DXD Backplane**
YounGyoung Chang, LG Display, Seoul, South Korea

9.3: **Widening the Wavelength Absorption Range of Indium Gallium Zinc Oxide Phototransistors through the Capping Layer**
Hyun Jae Kim, Yonsei University, Seoul, South Korea

9.4: **Fabrication of the Indirect X-Ray Detector Using Organic Photodiode**
Kyung-Tae Kang, Korea Institute of Technology (KITECH), Ansan, South Korea

Session 10: High-PPI OLED and Micro-LED Displays *(Display Electronics)*

Tuesday, May 10, 2022 / 2:00 PM - 3:00 PM / Room LL21EF

Chair: *Carlin Vieri, Google*

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

10.1: **Layout of 1.50-inch, 3207-ppi OLED Display with OSLSI/SiLSI Structure Capable of Division Driving Fabricated through VLSI Process with Side-by-Side Patterning by Photolithography**
Toshihio Saito, Semiconductor Energy Laboratory Co. Ltd., Atsugi, Japan

10.2: **Dual-Driver Pixel Circuit and Associated Drivers for Low-Power OLEDoS Microdisplays**
Sheida Gohardehi, University of Waterloo, Waterloo, ON Canada

10.3: **A Novel PAM-PWM Hybrid Driving Method for Micro-LED Displays**
Yingteng Zhai, Tianma Microelectronics Co., Ltd., Shanghai, China

Session 11: AR/MR - High Speed LC *(Liquid Crystal Technology)*

Tuesday, May 10, 2022 / 2:00 PM - 3:00 PM / Room LL20BC

Chair: *Takahiro Ishinabe, Tohoku University*

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

11.1: **100 Microseconds Response In-Plane Only Retardation Switching by Applied Voltage Polarity Dependent Smectic Liquid Crystals**
Akihiro Mochizuki, i-CORE Technology, LLC, Louisville, CO US

11.2: **High Brightness and Ultra-high PPI Field-Sequential-Color (FSC) Display based on Deformed Helix Ferroelectric Liquid Crystal for VR/AR**
Zhibo Sun, Hong Kong University of Science and Technology, Hong Kong, Hong Kong

11.3: ***Invited Paper:*** **New Materials for Film Optics and Game Changing Head Mount Devices**
Owain Parri, Merck Performance Materials Ltd., Southampton, United Kingdom

Session 12: Integrated Optical Sensing Displays *(Interactive Displays and Systems)*

Tuesday, May 10, 2022 / 2:00 PM - 3:20 PM / Room LL20A

Chair: *Jeff Han, Consultant*

Co-Chair: *Steven Bathiche, Microsoft*

12.1: ***Invited Paper:*** **Through-OLED Ambient Color Sensing**
Kenneth Vampola, Apple, Cupertino, CA US

12.2: **High Accuracy In-Cell Integrated Ambient Light and Color Temperature Sensor LCD**
Hui Guang Liu, TCL China Star Optoelectronics Technology Co., Ltd., Wuhan, China

12.3: **Investigation of Fingerprint on Display Technology for FLI Display**
Chuanxiang Xu, BOE, Beijing, China
12.4: **Tomography May Enable a Wavelength-Thin Camera**
Adrian Travis, Travoptics, Paris, France

Session 13: QD-LEDs III *(Emissive, Micro-LED, and Quantum-Dot Displays)*
Tuesday, May 10, 2022 / 3:40 PM - 5:20 PM / Room 220C
Chair: *Seth Coe-Sullivan, NS Nanotech*
Co-Chair: *Jonathan Steckel, ST Microelectronics*
13.1: ***Invited Paper:*** **Optimizations for the Commercialization of Ink-Jet Printing Quantum Dots Light Emitting Diodes Based Display**
Wenyong Liu, TCL, Shenzhen, China
13.2: **Modification of ZnMgO NPs for Improving Device Performance of All-Inkjet-Printed Quantum Dot Light-Emitting Diodes**
Jaekook Ha, Samsung Display Co., Ltd., Yongin, South Korea
13.3: ***Invited Paper:*** **Large-Area Solution-Processed NIR and SWIR Sources Based on Colloidal Quantum Dots**
Ted Sargent, University of Toronto, Toronto, Canada
13.4: ***Invited Paper:*** **Progress in SWIR Colloidal Quantum Dot Light Emitters: LEDs, Downconverters and Lasers**
Gerasimos Konstantatos, ICFO, Castelldefels, Spain
13.5: **Quantum Dot-in-Perovskite Near Infrared Light-Emitting Diodes**
Abd. Rashid Yusoff, Pohang University of Science and Technology (POSTECH), Pohang, South Korea

Session 14: Advanced IGZO/LTPS Devices *(Active Matrix Devices)*
Tuesday, May 10, 2022 / 3:40 PM - 5:00 PM / Room LL21CD
Chair: *Kenichi Takatori, Huawei Technologies Japan K.K.*
Co-Chair: *James Chang, Apple, Inc.*
14.1: **Enhanced Reliability Characterization of Pixel Circuit Featuring IGZO Device for Competitive Display Performance**
Taeyoung Khim, Samsung OLED Business, Yongin, South Korea
14.2: **Enhanced Electrical Characteristics of Low-Temperature Processed In-Ga-Zn-O Thin-Film Transistors with Oxygen Scavenging Layer**
Hyun Jae Kim, Yonsei University, Seoul, South Korea
14.3: **Extremely Short-Channel LTPS TFT Technologies for High-Performance Low-Power and Reliable AMOLED Displays**
Keunwoo Kim, Samsung Display, Youngin, South Korea
14.4: **Enhanced Low Temperature Polycrystalline Silicon Thin Film Transistor Device Structure by Doping at Channel Edge**
Seunghyun Jang, Samsung Display Company, Yongin, South Korea

Session 15: Ultra Low Power Driving , High-Speed I/F and IC Architecture *(Display Electronics)*
Tuesday, May 10, 2022 / 3:40 PM - 4:40 PM / Room LL21EF
Chair: *Dr. Bong-Hyun You, Samsung Display Co.*
Co-Chair: *Dr. Juhn Yoo, LG Display*
15.1: **A Novel Multi-Frequency Driving of OLED for Low Power Consumption**
Sangan Kwon, Samsung Display, Yongin, South Korea
15.2: **A 6.0Gbps Clock Embedded Interface for Advanced Mobile Display**
Dongwon Park, Samsung Display, Yongin, South Korea
15.3: **Cost-Effective Display Driver IC Architecture for First Frame Drop Compensation with Shared Memory Interface**
Jin-Yong Park, Samsung Eletronics Co., Gyeonggi, South Korea

Session 16: AR/MR - LC Lenses and Components *(Liquid Crystal Technology)*
Tuesday, May 10, 2022 / 3:40 PM - 4:40 PM / Room LL20BC
Chair: *Linghui Rao, Meta (Facebook)*
Co-Chair: *Michael Wittek, Merck KGaA*
16.1: **Optical Performance Characterization of 5 cm Aperture Size Continuous Focus Tunable Liquid Crystal Lens for Resolving Accommodation-Convergence Mismatch Conflict of AR/VR/3D HMDs**
Amit Bhowmick, Kent State University, Kent, OH US
16.2: ***Distinguished Paper:*** **Thin and Low-Reflection Metal Black Matrix for High PPI LCD**
Keisuke Yoshida, Sharp Display Technology Corporation, Tenri, Japan
16.3: **Compact Tunable Alvarez Lens Based on Pancharatnam-Berry Optical Elements**
Yan Li, Shanghai Jiao Tong University, Shanghai, China

Session 17: Capacitive Touch *(Interactive Displays and Systems)*
Tuesday, May 10, 2022 / 3:40 PM - 5:00 PM / Room LL20A
Chair: *Dr. John Zhong, Apple, Inc.*
Co-Chair: *Patrick Worfolk, Synaptics*
17.1: **Self-Capacitive Touch Sensor Design for OLED On-Cell Touch**
Yu-Ying Tang, Novatek Microelectronic Corp., Hsinchu, Taiwan Roc
17.2: **Integrated Self-Capacitance Touch Panel for Flexible OLED Display**
Feng Lu, Shanghai Tianma Micro-electronics Co., Ltd., Shanghai, China
17.3: **A Novel Solution to Proximity Detection with On-Cell Capacitive Touch Sensor**
Soongyu Lee, Samsung Display, Yongin, South Korea
17.4: **An Avionics Touchscreen Display for Safety Critical Applications**
Philippe Coni, Thales Avionics SAS, Merignac, France

Session 18: Human Vision and Evaluation Methods for AR/VR/MR *(Hyper-Realistic Displays (AR/VR/MR) / Applied Vision / Display Measurement)*

Wednesday, May 11, 2022 / 9:00 AM - 10:00 AM / Room 220B
Chair: *Jisoo Hong, Korea Electronics Technology Institute*
Co-Chair: *Soon-Gi Park, LetinAR*

18.1: ***Invited Paper:*** **Modeling and Optimizing Human-in-the-Loop Visual Perception Using Immersive Displays: A Review**
Qi Sun, New York University, Brooklyn, NY US

18.2: **Assessment of Image Quality in Augmented Reality Displays Using a Computational Model of Target Detectability**
Chumin Zhao, U.S. Food and Drug Administration, Silver Spring, MD US

18.3: **3D Image Quality Evaluation Method Based on Image Comparison Metrics**
Young-sang Ha, Samsung Display, Yongin, South Korea

Session 19: QD Color Conversion I *(Emissive, Micro-LED, and Quantum-Dot Displays)*

Wednesday, May 11, 2022 / 9:00 AM - 10:20 AM / Room 220C
Chair: *John Van Derlofske, 3M*
Co-Chair: *Michele Ricks, EMD Electronics*

19.1: ***Invited Paper:*** **Quantum Dot Display**
Shinae Jun, Samsung Advanced Institute of Technology, Suwon, South Korea

19.2: **Design Heuristics of Color Conversion Films in Micro LED Displays**
Khaled Ahmed, Intel Corporation, San Jose, CA US

19.3: **The Crucial Effect of Aspect Ratio of Quantum Dot Color-Conversion Pixels on the Performance of High-Resolution Full-Color MicroLED Microdisplay**
Ray-Kuang Chiang, Taiwan Nanocrystals Corp. Ltd., Tainan City, Taiwan Roc

19.4: **Triboelectric Discharging Problems in QD-OLED Manufacturing and Solutions Using Electromagnetic Analysis**
Hyun Sung Park, Samsung Display, Youngin, South Korea

Session 20: Advanced Active Matrix Backplanes *(Active Matrix Devices)*

Wednesday, May 11, 2022 / 9:00 AM - 10:20 AM / Room LL21CD
Chair: *Hyun Jae Kim, Yonsei University*
Co-Chair: *Sang-Hee Park, KAIST*

20.1: ***Distinguished Paper:*** **Advanced Hybrid Process with Back Contact IGZO-TFT**
Masatomo Honjo, Sharp Display Technology Corporation, Nara, Japan

20.2: **Integration of Through Glass Via Interconnects within Thin Film Transistor Active Matrix Backplanes**
Rajesh Va, Corning Research & Development Corporation, Corning, NY US

20.3: ***Invited Paper:*** **BEOL-Compatible Ferroelectric Field-Effect Transistors with Atomic Layer Deposition of Oxide Semiconductor Channel Toward Monolithic 3D Integration**
Mengwei Si, Shanghai Jiao Tong, 800 Dongchuan Rd, China

20.4: **High-Performance p-Channel Tellurium Thin-Film Transistor Applications Fabricated at a Low Temperature of 150 °C**
Jae Kyeong Jeong, Hanyang University, Seoul, South Korea

Session 21: OLED Optics *(OLEDs)*

Wednesday, May 11, 2022 / 9:00 AM - 10:20 AM / Room LL21EF
Chair: *CC Lee, Visionox*
Co-Chair: *Yifan Zhang, Apple, Inc.*

21.1: ***Invited Paper:*** **Polarized Emission Thin-Film Light Emitting Diodes**
Franky So, North Carolina State University, Raleigh, NC US

21.2: ***Invited Paper:*** **Improve OLED Light Outcoupling Efficiency by Eliminating Waveguide Mode Using Ultrathin Metal Electrode**
L. Jay Guo, University of Michigan, Ann Arbor, MI US

21.3: **Effect of Ag Adhesion Layer on Plasmon Outcoupling Efficiency**
Nicholas Thompson, Universal Display Corporation, Ewing, NJ US

21.4: **Implications of Spatial Coherence on Minimizing Diffractive Reflection Artifacts in OLED Displays**
S. Matthew Menke, 3M, St. Paul, MN US

Session 22: Emerging Liquid Crystal Technologies *(Liquid Crystal Technology)*

Wednesday, May 11, 2022 / 9:00 AM - 10:20 AM / Room LL20BC
Chair: *Xiao-Yang Huang, Ebulent Technologies Corp*
Co-Chair: *Gang Xu, Huawei*

22.1: ***Invited Paper:*** **Electrically Switchable Privacy Technology Suitable for Laptop PC**
Dong Jin Lee, LG Display, Paju, South Korea

22.2: **Field Sequential Color See-Through Panel Development**
Shinichi Terashita, Sharp Display Technology Corporation, Nara, Japan

22.3: **A New Near Infrared Polarizer with High Visible Transparency and its Sensor Applications**
Mayumi Nojiri, FUJIFILM Corporation, Minamiashigara, Japan

22.4: ***Invited Paper:*** **Display on Demand**
Ya-Ling Hsu, AU Optronics Corporation, Hsinchu, Taiwan Roc

Session 23: Advanced Display Characterization Methods *(Display Measurement)*

Wednesday, May 11, 2022 / 9:00 AM - 10:20 AM / Room LL20A
Chair: *Stephen Atwood, Consultant*
Co-Chair: *Thomas Fiske, Microsoft*

23.1: ***Invited Paper:*** **Visualization of Color Gamut Coverage—Gamut Ring Intersection**
Kenichiro Masaoka, NHK Science & Technology Research Laboratories, Setagaya, Japan

23.2: **Characterization of Directional Chromaticity of Cylindrically Curved OLED**

K Käläntär, Global Optical Solutions, Hachiouji, Japan

23.3: ***Distinguished Paper:*** **Utilizing Advanced Spatio-Temporal Backgrounds with Dynamic Test Signals for HDR Display Metrology**
Timo Kunkel, Dolby Laboratories, Inc., San Francisco, CA US

23.4: **Quick Detection and Evaluation of Irregular Response Time Behavior for High Frame Rate Displays Through Noticeable Artifacts**
Isao Kawahara, FairSpec & Co. LLC, Toyonaka, Japan

Session 24: Emerging Applications of Display Technology *(Emerging Technologies and Applications)*

Wednesday, May 11, 2022 / 9:00 AM - 10:20 AM / Room LL20D

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

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

24.1: **Can Light Microscopes Be Really Chip-Sized?**
Angel Dieguez, University of Barcelona, Barcelona, Spain

24.2: **Development of Methods to Reduce Blue Light Hazard from Displays**
Derek Harris, Eyesafe Inc., St. Paul, MN US

24.3: ***Distinguished Paper:*** **Towards a Solid-State LIDAR Using Holographic Illumination and a SPAD-Based Time-Of-Flight Image Sensor**
Konstantinos Bantounos, University of Edinburgh, Edinburgh, United Kingdom

24.4: **High Precision Beam Angle Expander Based on Polymeric Liquid Crystal Polarization Lenses for LiDAR Applications**
Yannanqi Li, University of Central Florida, Orlando, FL US

Session 25: Innovations in Microdisplays for AR/VR/MR *(Hyper-Realistic Displays (AR/VR/MR) / Display Manufacturing)*

Wednesday, May 11, 2022 / 10:40 AM - 12:00 PM / Room 220B

Chair: *Ion Bita, Google LLC*

Co-Chair: *Yunhee Kim, Samsung Electronics*

25.1: ***Invited Paper:*** **OLED Microdisplays for AR/VR Applications: Technical Approaches Toward Realization of over 10,000 Nits Full Color Panels**
Jang Jo, LG Display, Seoul, South Korea

25.2: ***Invited Paper:*** **Ultra-High-Resolution nanoLED Panel for AR/VR by UV Patterning Technology**
Kazuya Tsujino, Sharp Display Technology Corporation, Tenri, Nara, Japan

25.3: **RGB Direct Patterning for 3,000ppi OLED Micro-Display**
Chiwoo Kim, APS Research, Hwaseong, South Korea

25.4: ***Invited Paper:*** **Contact Lens Embedded MicroLED Micro-Displays**
Paul Martin, Mojo Vision, Saratoga, CA US

Session 26: QD Color Conversion II *(Emissive, Micro-LED, and Quantum-Dot Displays)*

Wednesday, May 11, 2022 / 10:40 AM - 12:00 PM / Room 220C

Chair: *Juanita Kurtin, OSRAM Opto Semiconductors*

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

26.1: ***Invited Paper:*** **Challenges in QD OLED Display Technology**
Ingo Koehler, Merck KGaA, Darmstadt, Germany

26.2: **How Perovskite Quantum Dots are Supporting the Rise of Mini-LED Based LCD Displays**
Norman Luechinger, Avantama AG, Stafa, Switzerland

26.3: **Optical Modeling of Quantum Dot-OLED (QD-OLED) Color Conversion**
Peter Palomaki, Palomaki Consulting, LLC, Billerica, MA US

26.4: **Perovskite Inks and Photoresists for In-Pixel Color Conversion**
Bernard Wenger, Helio Display Materials Ltd., Oxford, United Kingdom

Session 27: High Resolution Display Technology I *(Active Matrix Devices)*

Wednesday, May 11, 2022 / 10:40 AM - 11:40 AM / Room LL21CD

Chair: *Dr. Kalluri Sarma, Display Technology Consulting*

Co-Chair: *Chen Xi, BOE Technology Group Co., Ltd.*

27.1: **Fabrication Method for Miniaturized CAAC-OS FET for High-Definition AR/VR Displays**
Ryota Hodo, Semiconductor Energy Laboratory Co. Ltd., Atsugi, Japan

27.2: **Novel LTPS TFT Backplane Structure on Glass for 1443ppi 4.3'' AMOLED VR Displays**
Kummi Oh, LG Display, Paju, South Korea

27.3: ***Invited Paper:*** **High Performance Sub-50nm Channel Length 3-D Monolithically Stackable Vertical IGZO TFTs for Active Matrix Application**
Di Geng, Chinese Academy of Sciences, Beijing, China

Session 28: OLED Physics and Simulations *(OLEDs)*

Wednesday, May 11, 2022 / 10:40 AM - 12:00 PM / Room LL21EF

Chair: *Denis Kondakov, DuPont*

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

28.1: ***Invited Paper:*** **Bottom-Up OLED Development By Virtual Design: Systematic Elimination of Performance Bottlenecks Using a Microscopic Simulation Approach**
Tobias Neumann, Nanomatch GmbH, Karlsruhe, Germany

28.2: ***Invited Paper:*** **Accelerating OLED R&D with Digital Twins**
Arthur Vauzelle, Simbeyond B.V., Eindhoven, Netherlands

28.3: ***Invited Paper:*** **Enhanced Current Efficiency and Accumulation Charge in Model OLEDs by Light Irradiation During Deposition of Polar Molecule**
Yuya Tanaka, Chiba University, Chiba, Japan

28.4: ***Invited Paper:*** **Effects of Guest Clustering Morphology in Phosphorescent OLEDs**
Jeramy Zimmerman, Colorado School of Mines, GOLDEN, CO US

Session 29: Green, Low Power/Stretchable /LCDs *(Liquid Crystal Technology)*

Wednesday, May 11, 2022 / 10:40 AM - 12:00 PM / Room LL20BC
Chair: *Dr. Philip Chen, National Chiao Tung University*
Co-Chair: *Matthew Sousa, 3M*

29.1: ***Invited Paper:*** **Strategies to Improve Carbon Footprint of TFT Liquid Crystal Display**
Deeder Aurongzeb, Dell Company, Austin, TX US

29.2: ***Invited Paper:*** **An Ultra-Low Power FFS LCD Using Zero-Anchoring interface**
Hiroaki Asagi, Sharp Display Technology Corporation, Nara, Japan

29.3: ***Invited Paper:*** **Ultra-Thin Stretchable LCD Using Deformable Polarizer**
Ryo Kawamura, Nitto Denko Corporation, Osaka, Japan

29.4: **Novel High Impedance Driving of Zenithal Bistable LCDs**
Guy Bryan-Brown, New Vision Display, Malvern, United Kingdom

Session 30: Spatial and Temporal Display Metrology *(Display Measurement)*

Wednesday, May 11, 2022 / 10:40 AM - 12:00 PM / Room LL20A
Chair: *Stephen Atwood, Consultant*
Co-Chair: *Frank Rochow, Adviser*

30.1: **High-Precision High-Resolution Measurements within Moiré**
Ingo Rotscholl, TechnoTeam Bildverarbeitung GmbH, Ilmenau, Germany

30.2: **Visualization and Rating of Motion Artifacts by Analyzing Asymmetric Response Time Behavior**
Isao Kawahara, FairSpec & Co. LLC, Toyonaka, Japan

30.3: **A Moving Camera and Synthetic Calibration Target Solution for Non-Planar Scene Estimation and Projector Calibration**
Katherine Arnold, University of Waterloo, Waterloo, ON Canada

30.4: **Requirements for Reliable Display Sparkle Contrast Measurement: Analysis in Spatial Frequency Domain**
Masanobu Isshiki, AGC Inc., Yokohama, Japan

Session 31: Novel Display Technology Approaches *(Emerging Technologies and Applications)*

Wednesday, May 11, 2022 / 10:40 AM - 11:40 AM / Room LL20D
Chair: *Mr Timothy Large, Microsoft Corp*
Co-Chair: *Abhishek Srivastava, Hong Kong University of Science & Technology*

31.1: **Numerical Approach for Sound Quality Prediction of the Large-Sized OLED Panel Speaker**
Hyundo Shin, Samsung Display Co., Ltd., Yongin-si, South Korea

31.2: **Fermi Level Prediction of Solution-Processed Ultra-wide Band gap a-Ga2Ox via Supervised Machine Learning Models**
Juan Bermundo, Nara Institute of Science and Technology, Ikoma, Japan

31.3: **Multi-Primary Wide Gamut Color Systems**
Gary Feather, 6p Color, Portland, OR US

Session 32: High Resolution Display Technology II *(Active Matrix Devices)*

Wednesday, May 11, 2022 / 3:30 PM - 4:50 PM / Room LL21CD
Chair: *Norbert Fruehauf, University of Stuttgart*
Co-Chair: *Man Wong, Hong Kong University of Science & Technology*

32.1: **Oxide Semiconductor Field-Effect Transistor for High-Resolution Displays Capable of Deep Black Display**
Yutaka Okazaki, Semiconductor Energy Laboratory Co., Ltd., Atsugi, Japan

32.2: **An Optical Compensation Scheme for High PPI AMOLED Display**
Ying Han, Hefei BOE Joint Technology Co. Ltd., Hefei, China

32.3: **1.5-inch, 3207-ppi Side-by-Side OLED Display Capable of 32-Division Driving with OSLSI/SiLSI Structure Fabricated by Photolithography**
Munehiro Kozuma, Semiconductor Energy Laboratory Co. Ltd., Atsugi, Japan

32.4: **Metal Oxide Thin-Film Transistors with 0.1 ?m Channel Length Formed by Self-Aligned Nanogap Patterning**
Sung Haeng Cho, Electronics and Telecommunications Research Institute, Daejeon, South Korea

Session 33: Printed OLED *(OLEDs)*

Wednesday, May 11, 2022 / 3:30 PM - 4:50 PM / Room LL21EF
Chair: *Sven Zimmermann, Novaled GmbH*
Co-Chair: *Denis Kondakov, DuPont*

33.1: ***Invited Paper:*** **All-Inkjet-Printed AMOLED Display with Improved Efficiency and Lifetime**
Sehun Kim, Samsung Display Co., Ltd., Yongin, South Korea

33.2: ***Invited Paper:*** **Flexible OLED Displays with Inkjet Printing Technology**
Weiran Cao, Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd., Shenzhen, China

33.3: ***Invited Paper:*** **Research and Applications of Inkjet Printing for OLED Mass Production**
Gerry Chen, Kateeva, Inc., Newark, CA US

Session 34: High Dynamic Range LCDs *(Liquid Crystal Technology)*

Wednesday, May 11, 2022 / 3:30 PM - 5:30 PM / Room LL20BC
Chair: *Jenn Jia Su, AU Optronics Corporation*
Co-Chair: *Koichi Miyachi, JSR Corporation*

34.1: **Novel Liquid Crystal Display Mode SUVA4&SUVA5 with Double Photo Alignment Technology for High Definition Display**
Fan Li, BOE Technology Group Co., Ltd., Chengdu, China

34.2: ***Invited Paper:*** **Analysis of Temperature Effect of RGB Mini/Micro LED Chips**
Yuanhao Sun, BOE MLED Technology Co.,Ltd., Beijing, China

34.3: **High Contrast Research of 4K ADS TV Technology**
Hongling Hu, Hefei BOE Display Technology Co., Ltd., Hefei, China

34.4: ***Invited Paper:*** **UBplus/UB-FFS – Premium Performance for Liquid Crystal TV and IT Displays**

Lawrence Huang, Merck Display Materials Co., Ltd., Shanghai, China

34.5: ***Invited Paper:*** **C-PS-VA – Innovative LC materials Enabling Super High Transmittance for High Resolution Displays**
Susan Chuang, Merck Performance Materials Ltd., Taoyuan, Taiwan Roc

34.6: ***Invited Paper:*** **High Image Quality of 8K TV LCDs with Negative LC**
Dong-Chuan Chen, Beijing BOE Display Technology Co., Ltd., Beijing, China

Session 35: Halo Measurements *(Display Measurement / Automotive/Vehicular Displays and HMI Technologies)*

Wednesday, May 11, 2022 / 3:30 PM - 4:50 PM / Room LL20A

Chair: *Frank Rochow, Adviser*

Co-Chair: *Thomas Fiske, Microsoft*

35.1: **Halo Mura of OLED and FALD LCD: Measurements & Perception for (Automotive) Displays**
Karlheinz Blankenbach, Pforzheim University Display Lab, Pforzheim, Germany

35.2: **Proposal for Improved Calculation Method for the Halo Effect in Digital Displays Based on Human Brightness Perception**
Han Byul Lim, Samsung Display, Yongin, South Korea

35.3: **The Measurement Method of Halo: Halo Length, Angular Halo**
Hyunah Suh, Samsung Display, Yongin, South Korea

35.4: **Systematic Comparisons on Display Performances Including Halo Effect**
Zhiyong Yang, University of Central Florida, Orlando, FL US

Session 36: Novel Processes & MicroOptics *(Emerging Technologies and Applications)*

Wednesday, May 11, 2022 / 3:30 PM - 4:50 PM / Room LL20D

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

Co-Chair: *Jim Zhuang, Meta*

36.1: ***Invited Paper:*** **Liquid Crystal Lasers: Recent Advances and Future Opportunities**
Philip Hands, School of Engineering, University of Edinburgh, Edinburgh, United Kingdom

36.2: **Optimizing Brightness with Micro Lens Array Gain Enhancing Films for Edge-Lit Back Light Units**
Bing Shen, BrightView Technologies, Durham, NC US

36.3: **Novel Silicone Hotmelt Adhesive for Display Assembly Applications**
Ryosuke Yamazaki, Dow Toray Co., Ltd., Ichihara, Japan

36.4: **Precision Micro-Optics on Display Technical Glass for Innovative Display Designs**
Casey Kang, Corning Incorporated, Corning, NY US

Session 37: Holographic and Autostereoscopic 3D Displays *(Hyper-Realistic Displays (AR/VR/MR) / Display Systems)*

Thursday, May 12, 2022 / 9:00 AM - 10:40 AM / Room 220B

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

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

37.1: ***Invited Paper:*** **Advances in Neural Holographic Displays for Virtual and Augmented Reality**
Manu Gopakumar, Stanford University, Stanford, CA US

37.2: ***Invited Paper:*** **Enabling Augmented Reality Near-eye and Head-Up Displays with Neural Holography**
Suyeon Choi, Stanford University, Stanford, CA US

37.3: **Method of Color Amplitude-Only Hologram Generation for Speckle Noise Suppression**
Qiong-Hua Wang, Beihang University, Beijing, China

37.4: **Depth-Enhanced 2D/3D Switchable Display Based on Integral Imaging**
Qiang Li, Sichuan University, Chengdu, China

37.5: ***Invited Paper:*** **Flat Panel Holographic Display**
Yunhee Kim, Samsung Electronics Co., Ltd., Suwon, South Korea

Session 38: Micro-LEDs I *(Emissive, Micro-LED, and Quantum-Dot Displays)*

Thursday, May 12, 2022 / 9:00 AM - 10:20 AM / Room 220C

Chair: *Chris Bower, X Display Company*

Co-Chair: *Jonathan Steckel, ST Microelectronics*

38.1: **GaN Nanowire LED Technology: Moving to Products.**
Xavier Hugon, Aledia, Echirolles, France

38.2: **Latest Breakthroughs in 200 and 300 mm epi Technology to Unlock the Micro LED Revolution for the Metaverse and Beyond**
Atsushi Nishikawa, ALLOS Semiconductors GmbH, Dresden, Germany

38.3: ***Invited Paper:*** **MicroLED Device Technology for Low Power Wearable Displays**
Oleg Shchekin, Lumileds, San Jose, CA US

38.4: ***Invited Paper:*** **Inline Screening Known Good Die Mapping for MicroLED**
John Robinson, KLA Corporation, Milpitas, CA US

Session 39: E-Paper and Transparent Display Measurements *(Outdoor Displays / Display Measurement)*

Thursday, May 12, 2022 / 9:00 AM - 10:20 AM / Room LL21CD

Chair: *Stephen Atwood, Consultant*

Co-Chair: *Karlheinz Blankenbach, Pforzheim University*

39.1: ***Distinguished Paper:*** **Gamut Rings of Reflective ePaper Displays with Combined Frontlight and Ambient Illumination**
Dirk Hertel, E Ink Corp., Billerica, MA US

39.2: **Evaluating the Components of Reflected Glare in Displays**
John Penczek, University of Colorado, Boulder, CO US

39.3: **Fluorescence Enhanced Optical Resonator Constituted of Quantum Dots and Thin Film Resonant Cavity for High-Efficiency Reflective Color Filter**
Qian Wu, BOE Technology Group Co., Ltd., Beijing, China

39.4: **High Performance Micro-LED Transparent Display**
Liqun Chen, Tianma Microelectronics Co., Ltd., Shanghai, China

Session 40: OLED Devices I *(OLEDs)*
Thursday, May 12, 2022 / 9:00 AM - 10:20 AM / Room LL21EF
Chair: *Yasunori Kijima, Huawei Technologies Japan K.K.*
Co-Chair: *Larry Liao, Soochow University*

40.1: ***Invited Paper:*** **Marching Towards Theoretical Limits of Blue Fluorescent OLEDs with BI > 300**
Xiao Liang, Jiangsu Sunera Technology, Wuxi, China

40.2: ***Invited Paper:*** **Prolonging Device Lifetime of Blue Organic Light-Emitting Diodes**
Sunghan Kim, Samsung Display Co., Ltd., Yongin, South Korea

40.3: ***Distinguished Paper:*** **Realization of Ultra High Efficient Fluorescent Blue OLED**
Satomi Tasaki, Idemitsu Kosan Co., Ltd., Chiba, Japan

40.4: **Double EML Structure for High Efficiency Organic Light Emitting Diode**
Eun-Hyung Lee, LG Display Co., Ltd., Seoul, South Korea

Session 41: Stretchable High-Resolution Displays *(Conformable Wearable Displays)*
Thursday, May 12, 2022 / 9:00 AM - 10:20 AM / Room LL20BC
Chair: *Yong Taek Hong, Seoul National University*
Co-Chair: *Jeong-Ik Lee, ETRI*

41.1: ***Invited Paper:*** **The Technical Advances of Stretchable Display for High Pixel Density and High Stretchability**
Jangyeol Yoon, Samsung Display, Yongin, South Korea

41.2: ***Invited Paper:*** **Active-Matrix Micro-LED Stretchable Display and Technical Challenges**
Haeyoon Jung, LG Display, Seoul, South Korea

41.3: ***Invited Paper:*** **A High Resolution Stretchable Micro-LED Display**
Cheng-Liang Wang, AU Optronics, Hsinchu, Taiwan Roc

41.4: ***Invited Paper:*** **A 200 PPI Oval Shape Stretchable AMOLED Display**
Pinfan Wang, BOE Technology Group Co., Ltd., Beijing, China

Session 42: Light Field Displays *(Hyper-Realistic Displays (AR/VR/MR) / Display Systems)*
Thursday, May 12, 2022 / 10:40 AM - 12:00 PM / Room 220B
Chair: *Brian Schowengerdt, University of Washington*
Co-Chair: *Shinichi Uehara, AGC Inc.*

42.1: ***Invited Paper:*** **High-Resolution Light-Field AR at Comparable Computing Cost to Stereo 3D**
Tomas Sluka, CREAL, Ecublens, Switzerland

42.2: **Spatial Resolution-Tripled Integral Imaging Light Field Displays with No Loss of Angular Resolution by Recombining Subpixels with Zero Sampling Error**
Wenchao Yang, Sun Yat-Sen University, Guangzhou, China

42.3: **Real-time Rendering for Integral Imaging Light Field Displays Based on a Voxel-Pixel Lookup Table**
Quanzhen Wan, Sun Yat-Sen University, Guangzhou, China

42.4: **Near-Eye Light Field Displays with Computational Vision Correction by Manipulating Vector Sampling Rays**
Yuqing Qiu, Sun Yat-Sen University, Guangzhou, China

Session 43: Micro-LEDs II *(Emissive, Micro-LED, and Quantum-Dot Displays)*
Thursday, May 12, 2022 / 10:40 AM - 11:40 AM / Room 220C
Chair: *Francois Templier, CEA-LETI*
Co-Chair: *Larry Weber, Consultant*

43.1: ***Invited Paper:*** **Recent Advancements in microLED Testing and Inspection**
David Lewis, InZiv, Jerusalem, Israel

43.2: **Low Efficiency Attenuation and Stable Monochromaticity for Non-Polar m-Plane Micro-Light-Emitting-Diodes (Micro-LEDs)**
Yibo Liu, Hong Kong University of Science and Technology, Hong Kong, Hong Kong

43.3: **Enhanced External Quantum Efficiency in the Low-Current Region Using Three Terminal GaN-Based Blue Micro-Light-Emitting Diodes**
Woo Jin Baek, Korea Advanced Institute of Science and Technology, Daejeon, South Korea

Session 44: E-Paper Display Technologies and Applications *(Outdoor Displays / Flexible Displays and e-Paper)*
Thursday, May 12, 2022 / 10:40 AM - 11:40 AM / Room LL21CD
Chair: *Norihisa Kobayashi, Chiba University, Department of Image and Materials Science*
Co-Chair: *Shin Tson Wu, University Of Central Florida*

44.1: ***Distinguished Paper:*** **Electrophoretic Display Comprising Black, White, Red and Yellow Particles**
HongMei Zang, E Ink California, LLC., Fremont, CA US

44.2: **Electronic Tile for Decoration of Outdoor/Indoor Walls**
Makoto Omodani, Tokyo Denki University, Saitama, Japan

44.3: **High-Performance Color MIP LCD with New Electrode Structure**
Takashi Sato, Sharp Display Technology Coroporation, Nara, Japan

Session 45: OLED Devices II *(OLEDs)*
Thursday, May 12, 2022 / 10:40 AM - 12:00 PM / Room LL21EF
Chair: *Nicholas Thompson, Universal Display Corporation*
Co-Chair: *Ji Ho Baek, LG Display*

45.1: ***Invited Paper:*** **Charge Balance in OLEDs: Optimization of Hole Injection Layer**
Huiqing Pang, Beijing Summer Sprout Technology Co., Ltd., Beijing, China

45.2: ***Invited Paper:*** **Towards High-Performance Organic Transistors for Display and other Applications**

Karl Leo, Technische Universität, Dresden, Germany

45.3: **Effects of Near-UV Irradiation on Organic Light-emitting Diodes and Their Solutions Using UV Blocking Layer**
Jungjin Yang, Samsung Display, Giheung, South Korea

45.4: **A High Performance Full-fluorescent Electroluminescence solution with a 96.5% Coverage of B.T. 2020 Color Gamut**
Xiaojin Zhang, BOE Technology Group. Co., Ltd., Beijing, China

Session 46: Wearable and Skin-Like Displays *(Conformable Wearable Displays / Flexible Displays and e-Paper / Active Matrix Devices)*

Thursday, May 12, 2022 / 10:40 AM - 12:00 PM / Room LL20BC

Chair: *Xiaojun Guo, Shanghai Jiao Tong University*

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

46.1: **High-Performance Fiber-Based Red OLEDs and TFTs for Truly Wearable Textile Displays**
Kyung Cheol Choi, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea

46.2: ***Invited Paper:*** **Strip-Helix-Fiber Architecture for Stretchable TFTs and Circuits**
Arokia Nathan, University of Cambridge, Cambridge, United Kingdom

46.3: ***Invited Paper:*** **Skin-like Organic Optoelectronic System for Real-time Heart Rate Monitoring**
Youngjun Yun, Samsung Electronics, Suwon, South Korea

46.4: **Reconfigurable and Reusable Soft Modular LED Blocks Assembly**
Yongtaek Hong, Seoul National University, Seoul, South Korea

Session 47: Automotive Display Optimizations *(Automotive/Vehicular Displays and HMI Technologies)*

Thursday, May 12, 2022 / 10:40 AM - 12:00 PM / Room LL20A

Chair: *David Hermann, Volvo Car Corporation AB*

Co-Chair: *Eric Margulies, Universal Display Corporation*

47.1: **Display Outdoor Visibility Enhancement Using Adaptive Tone Mapping**
Seungwan Kim, Samsung Electronics, Hwaseong, South Korea

47.2: **Monocular Depth Perception Enhancement Based on Joint Shading/Contrast Model and Motion Parallax (JSM)**
Seungchul Ryu, Faurecia Irystec Inc., Montreal, PQ Canada

47.3: **Electromagnetic Compatibility Problem Analysis of Flexible Vehicle Organic-Light Emitting Display**
Hang Dong, Chengdu BOE Optoelectronics Technology Co., Ltd., Chengdu, China

47.4: **Color Acceptability Threshold for Mixed Display Technology Automotive Cockpit**
Pooshpanjan Roy Biswas, Renault, Guyancourt, France

Session 48: LTPO Technology *(Display Manufacturing / Active Matrix Devices)*

Thursday, May 12, 2022 / 10:40 AM - 12:00 PM / Room LL20D

Chair: *Dr. Chiwoo Kim, APS Holdings*

Co-Chair: *Jae-Hoon Lee, Samsung Display Co*

48.1: **Solid-State Laser Crystallization for Poly-Si TFTs and Their Applications**
Hiroshi Tanabe, Tianma Japan, Ltd., Kawasaki, Japan

48.2: ***Invited Paper:*** **Advanced LTPO Technology for CMOS Driving**
KookChul Moon, Gachon University, Seongnam, South Korea

48.3: ***Invited Paper:*** **Fiber-Laser Processing of Si and IGZO Films for Advanced AMOLED Displays on Gen 8 Substrates**
James Im, Columbia University, New York, NY US

48.4: **LTPO Technology Development for Enhanced Display Performance: Image Sticking Phenomena, Circuit Operation and Backplane Process Integration**
D.-Y. Cho, Samsung Display, Yongin, South Korea

Session 49: Light Manipulation for VR/AR Optics *(Hyper-Realistic Displays (AR/VR/MR) / Display Systems)*

Thursday, May 12, 2022 / 1:30 PM - 3:10 PM / Room 220B

Chair: *Nikhil Balram, Mojo Vision Inc.*

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

49.1: ***Distinguished Paper:*** **Gaze Matched Pupil Steering Maxwellian-View Augmented Reality Display**
Junyu Zou, University of Central Florida, Orlando, FL US

49.2: **Holographic Near-Eye Display with Expanded Eyebox Based on Exit Pupil Scanning**
Xinxing Xia, Shanghai University, Shanghai, China

49.3: **Building a Predictive Model of Contrast Ratio of Folded Optic Lens Systems for Virtual Reality**
Bing Hao, 3M Company, St. Paul, MN US

49.4: **Thin and Lightweight Head-Mounted Displays with Polarized Laser Backlights and Holographic Optics**
Shinichi Komura, Japan Display Inc., Mobara, Japan

49.5: **Fast-response Pancharatnam-Berry Phase LC lens for AR Display**
Shuxin Liu, Shanghai Jiao Tong university, Shanghai, China

Session 50: Micro-LED Displays I *(Emissive, Micro-LED, and Quantum-Dot Displays)*

Thursday, May 12, 2022 / 1:30 PM - 2:50 PM / Room 220C

Chair: *Dr. Khaled Ahmed, Intel Corporation*

Co-Chair: *Ioannis Kymissis, Columbia University*

50.1: ***Invited Paper:*** **Designs and Manufacturing Processes for MicroLED Displays in Handsets, Smartwatches, and Personal Computers.**
Matthew Meitl, X Display Company, Inc., Research Triangle Park, NC US

50.2: ***Invited Paper:*** **Why Does the Road to High Volume Production of Micro-LED Displays Pass Through the Semiconductors Industry?**
Makarem Hussein, LuxNour Technologies, Hillsboro, OR US

50.3: **Status of MicroLED Mass Transfer Processes and Equipment**

Eric Virey, Yole Developpement, Portland, OR US

50.4: ***Invited Paper:*** **Development of MicroLED Display Technology and Applications**
Ying-Tsang Liu, PlayNitride Display Co., Ltd., Miaoli, Taiwan Roc

Session 51: Large and Tiled Display Technologies *(Outdoor Displays / Display Systems)*

Thursday, May 12, 2022 / 1:30 PM - 2:50 PM / Room LL21CD

Chair: *K Käläntär, Global Optical Solutions*

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

51.1: **Method to Suppress Tiled Display Seam Visibility**
Shenping Li, Corning Research & Development Corporation, Corning, NY US

51.2: **Glass Solution for Zero Border Design (ZBD) TVs: Its Advantages and Prevention of Border Light Leakage**
Tomohiro Ishikawa, Corning Incorporated, Corning, NY US

51.3: **65-inch Splicing Screen Adapted to a Wide Temperature Range and High Brightness**
Peng Xi Wang, Hefei BOE Display Technology Co., Ltd., Hefei, China

51.4: **Design, Measurements and Evaluation of Exterior Displays for Autonomous Cars**
Karlheinz Blankenbach, Pforzheim University Display Lab, Pforzheim, Germany

Session 52: OLED Displays I *(OLEDs)*

Thursday, May 12, 2022 / 1:30 PM - 3:10 PM / Room LL21EF

Chair: *Yifan Zhang, Apple, Inc.*

Co-Chair: *Sangmoo Choi, Google LLC*

52.1: ***Invited Paper:*** **Technical Progress of OLED Displays for Premium TVs**
Hong Jae Shin, LG Display, Paju, South Korea

52.2: **Ultrawide-Color Gamut, Low-Power Consumption White OLEDs for Large-Sized 8K OLED TV**
Juanjuan You, Hefei BOE Joint Technology Co., Ltd., Hefei, China

52.3: **Enhanced Viewing Angle Performance of an Advanced WRGB OLED Technology**
Don Gyou Lee, LG Display, Seoul, South Korea

52.4: **Novel POL-less OLED Structure with High Optical Gain**
Jongbeom Hong, Samsung Display, Yongin, South Korea

52.5: **A Color Gamut Mapping Method Using an OLED Display Model**
Deoksoo Park, Samsung Display, *Hwaseong*, South Korea

Session 53: Foldable Displays *(Flexible Displays and e-Paper)*

Thursday, May 12, 2022 / 1:30 PM - 2:30 PM / Room LL20BC

Chair: *Dr. Joon Young Yang, LG Display Co. Ltd*

Co-Chair: *Shiming Shi, BOE*

53.1: **The Foldable Display Architecture Technique Depending on Wide Temperature Range and Folding Curvature**
Min-Ho Lee, LG Display, Seoul, South Korea

53.2: **Analysis on the Advantages of Water-Drop Shape Foldable Display**
Shi Shi, BOE Technology Group Co., Ltd., Beijing, China

53.3: **Worldwide First Real Borderless and High Resolution Micro-LED Display**
Tin Kang, AU Optronics Corp., Hsinchu, Taiwan Roc

Session 54: HUD and Transparent Automotive Displays *(Automotive/Vehicular Displays and HMI Technologies)*

Thursday, May 12, 2022 / 1:30 PM - 3:10 PM / Room LL20A

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

Co-Chair: *Haruhiko Okumura, Toshiba Corporation*

54.1: ***Invited Paper:*** **AR in an Automobile: 3D AR HUD**
Jae Won Cha, Naver Labs, Seongnam, South Korea

54.2: **A Measurement-Based Image Compositing for 3D Head-Up-Display**
Akinori Sato, Kyocera Corporation, Yasu, Japan

54.3: **Reduced Solar-Loading Using Micro-Mirror Array in Automotive HUD**
Kenneth Li, Optonomous Technologies Inc., Agoura Hills, CA US

54.4: ***Distinguished Paper:*** **Low-Diffraction Transparent µLED Displays with Optimized Pixel Structure**
Qian Yang, University of Central Florida, Orlando, FL US

54.5: **Consideration of Image Distance on Cognitive Tunneling with Augmented Reality Head Up Displays**
Joe Pullukat, NS North America/Nippon Seiki, Troy, MI US

Session 55: Advanced Manufacturing Process Technologies *(Display Manufacturing)*

Thursday, May 12, 2022 / 1:30 PM - 2:50 PM / Room LL20D

Chair: *Joerg Winkler, PLANSEE SE*

Co-Chair: *Tian Xiao, NEXT Biometrics Inc.*

55.1: **Deposition of Conductive and Insulating Materials at Micrometer Scale for Display-Component Prototyping**
Piotr Kowalczewski, XTPL SA, Wroc?aw, Poland

55.2: **Roll-to-Plate Nanoimprint Lithography as Etching Mask Creating Large Area Structured Surfaces**
Jan Matthijs ter Meulen, Morphotonics B.V., Veldhoven, Netherlands

55.3: **Development Low Temperature Metal Dry Etching Equipment via ECR Plasma Source**
Chiwoo Kim, APS Research Corporation, Cheonan, South Korea

55.4: **True Printing Process for Integration of Optoelectronic MicroDevices into Functionalized Surfaces**
Reza Chaji, VueReal Inc., Waterloo, ON Canada

Session 56: System Architectures for VR/AR/MR *(Hyper-Realistic Displays (AR/VR/MR) / Display Systems)*
Thursday, May 12, 2022 / 3:10 PM - 4:10 PM / Room 220B
Chair: *W. Hendrick, Collins Aerospace*
Co-Chair: *Brian Berkeley, Highlight Display, LLC*

56.1: **Novel Optical Structure of OLED Panel for Immersive and Seamless VR**
Kwangsoo Bae, Samsung Display, Yongin, South Korea

56.2: **A Distraction-Free Display System Using Embedded Asynchronous Time Warp**
Wook Hong, RAONTECH Inc., Seongnam, South Korea

56.3: **New Ultra Low-Power High Brightness Microdisplays Enabling Broad Applications**
Philipp Wartenberg, Fraunhofer Institute for Organic Electronics, Dresden, Germany

Session 57: Micro-LED Displays II *(Emissive, Micro-LED, and Quantum-Dot Displays)*
Thursday, May 12, 2022 / 3:10 PM - 4:30 PM / Room 220C
Chair: *Ioannis Kymissis, Columbia University*
Co-Chair: *Jonathan Steckel, ST Microelectronics*

57.1: **ActiveHogel Light-Field Display: An Application of Next Generation µLED Pixels**
Thomas Burnett, FoVI3D, Austin, TX US

57.2: ***Invited Paper:*** **Self-Aligned Colored MicroLED Microdisplay for Compact AR Applications**
Reza Chaji, VueReal Inc., Waterloo, ON Canada

57.3: **MircoLED Display Integration on 300mm Advanced CMOS Platform**
Soeren Steudel, MICLEDI Microdisplays BV, Leuven, Belgium

57.4: ***Invited Paper:*** **Progress on Key Innovations in Direct-View µLED Display Manufacturing**
Mingwei Zhu, Applied Materials, Inc., Santa Clara, CA US

Session 58: Smart Windows *(Outdoor Displays / Liquid Crystal Technology / Emerging Technologies and Applications)*
Thursday, May 12, 2022 / 3:10 PM - 4:30 PM / Room LL21CD
Chair: *Abhishek Srivastava, Hong Kong University of Science & Technology*
Co-Chair: *Karlheinz Blankenbach, Pforzheim University*

58.1: ***Invited Paper:*** **LC Dynamic Glazing – The Window Becomes a Pixel and the Façade a Giant Display**
Michael Grund, Merck KGaA, Darmstadt, HI Germany

58.2: **ELM: A Revolutionary New Smart Glass Technology**
Romaric Massard, Elstar Dynamics, Eindhoven, Netherlands

58.3: **Switchable Liquid Crystal Phase Grating with Rainbow-Free Hazy States**
Chin An Lin, AU Optronics Corporation, Hsinchu, Taiwan Roc

58.4: **Factors Affecting the Thermal Performance of Dye-Doped Liquid Crystal Smart Window**
Zhan Li, Beijing BOE Sensor Technology Co., Ltd., Beijing, China

Session 59: OLED Displays II *(OLEDs)*
Thursday, May 12, 2022 / 3:10 PM - 4:30 PM / Room LL21EF
Chair: *DZ Peng, Tianma*
Co-Chair: *Yuan-Chun Wu, China Star Optoelectronics*

59.1: ***Invited Paper:*** **Scaling Down of OLED Pixels Enabled by Photolithography**
Jan Genoe, imec, Leuven, Belgium

59.2: ***Invited Paper:*** **High Color Gamut Organic Light-emitting Diode Microdisplay for Augmented Reality/Virtual Reality Devices**
Chan-mo Kang, Electronics and Telecommunications Research Institute, Daejeon, South Korea

59.3: **A Thin, Transparent Encapsulation Film with Excellent Gap-filling Performance for Ultra-High-Resolution OLEDs via Vapor-Phase Deposited Polymeric Layer**
Byeong Gyu Roh, LG Display, Paju, South Korea

59.4: **Premium Black for Large sized White OLED**
Garam Hong, LG Display, Paju, South Korea

Session 60: E-Paper Technologies *(Flexible Displays and e-Paper)*
Thursday, May 12, 2022 / 3:10 PM - 4:10 PM / Room LL20BC
Chair: *Makoto Omodani, Tokyo Denki University*
Co-Chair: *HongMai Zang, E Ink California*

60.1: ***Distinguished Paper:*** **An Electrophoretic E-Paper Device with Stretchable, Washable, and Rewritable Functions**
Boru Yang, Sun Yat-Sen University, Guangzhou, China

60.2: **Image Plane Separation Artefacts in Multi-layer Color Reflective Displays**
Alex Henzen, South China Normal University, Guangzhou, China

60.3: ***Invited Paper:*** **Active-Matrix Digital Microfluidics System for Single Cells Manipulation**
Hanbin Ma, Guangdong ACXEL Micro & Nano Tech Co., Ltd.,, Foshan, China

Session 61: Novel Large-Area Automotive Displays *(Automotive/Vehicular Displays and HMI Technologies)*
Thursday, May 12, 2022 / 3:10 PM - 4:30 PM / Room LL20A
Chair: *Casey Kang, Corning Incorporated*
Co-Chair: *Eric Margulies, Universal Display Corporation*

61.1: ***Invited Paper:*** **OLED Technology for Automotive Display Applications**
Tomasz Tarnowski, Mercedes - Benz AG, Sindelfingen, Germany

61.2: ***Invited Paper:*** **ShyTech DisplaysHigh Resolution Displays Hidden Behind Decorative Surfaces**
Juergen Baethis, Continental Automotive GmbH, Babenhausen, Germany

61.3: **Research on Switchable Privacy Mode Applied to Automotive Displays**

Zhi Zhang, BOE Optoelectronics Technology Co., Ltd., Beijing, China

61.4: **Display Visual Security: From Laptop Privacy to No Driver Distraction for Automotive Passenger Infotainment**
Graham Woodgate, Rain Technology Research Ltd., Oxford, United Kingdom

Session 62: Innovative Glass Substrates and Processing *(Display Manufacturing)*

Thursday, May 12, 2022 / 3:10 PM - 4:30 PM / Room LL20D

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

Co-Chair: *Kazutaka Hayashi, AGC Inc.*

62.1: **Large Area Ion Implantation Source for Production of Anti-Reflection Surfaces in Glass and Sapphire Substrates**
Alexander Welsh, Malachite Technologies, Inc., San Francisco, CA US

62.2: **Ultra-Flat, Low-Density, and High-Refractive-Index Glass Wafers for Augmented Reality: Weight Reduction as Key Enabler for Consumer Devices**
Frederik Bachhuber, SCHOTT AG, Mainz, Germany

62.3: ***Distinguished Paper:*** **High Precise Laser Glass Cutting for Future Display**
Woohyun Jung, Samsung Display, Yongin, South Korea

62.4: **Investigation of the Influence of Film Stress on Glass Strength**
Wencheng Hu, HeFei BOE Photoelectric Technology Co., Ltd., Hefei, China

Session 63: Emerging Approaches for AR/VR/MR *(Hyper-Realistic Displays (AR/VR/MR) / Emerging Technologies and Applications)*

Friday, May 13, 2022 / 9:00 AM - 10:20 AM / Room 220B

Chair: *Ian Underwood, University of Edinburgh*

Co-Chair: *Soon-Gi Park, LetinAR*

63.1: ***Distinguished Paper:*** **Microsecond High-Contrast Continuous 2.25pi Phase Modulation Based on Non-linear Kerr Effect of VADHFLC**
Zhengnan Yuan, Hong Kong University of Science and Technology, Hong Kong, Hong Kong

63.2: **Research on Stray Light Affecting the Imaging of Fresnel Lens in Virtual Reality Equipment**
Haitao Huang, BOE Technology Group Co., Ltd., Beijing, China

63.3: **High-Directivity Emitting Pixel Devices for Advanced Display Applications**
Chung-Chih Wu, National Taiwan University, Taipei, Taiwan Roc

63.4: **A Novel Real-Time Full-Color 3D Holographic (Diffractive) Video Capture, Processing And Transmission Pipeline Using Off-the-Shelf Hardware**
Ankur Samanta, University of Toronto, Toronto, ON Canada

Session 64: Mini-LED BLU for HDR Display *(Display Systems)*

Friday, May 13, 2022 / 9:00 AM - 10:40 AM / Room 220C

Chair: *K Käläntär, Global Optical Solutions*

Co-Chair: *Daming Xu, Apple Inc*

64.1: **A Local Dimming Technology of Scene Adaptation for Massive Mini-LED**
Ran Duan, BOE Technology Group Co., Ltd., Beijing, China

64.2: **Ultra-Thin RGB-Mini-LED Direct Back Light for High-end Professional Liquid Crystal Displays**
Xianqin Meng, BOE Technology Group Co., Ltd., Beijing, China

64.3: **Patterned Glass Diffuser for Mini-LED Count Reduction**
Xiang-Dong Mi, Corning Incorporated, Corning, NY US

64.4: **Mini-LED Driving Circuit with Power Saving Mechanism for Use in LCD Backlight Module**
Chih-Lung Lin, National Cheng Kung University, Tainan, Taiwan Roc

64.5: **Glass Circuit Board for Mini-LED Backlight of LCD**
Young-suk Lee, CTCK (Corning Technology Center Korea), Asan, South Korea

Session 65: Machine Learning for Image Enhancement *(Machine Learning for Displays / Display Electronics / Applied Vision)*

Friday, May 13, 2022 / 9:00 AM - 10:40 AM / Room LL21CD

Chair: *Chaohao Wang, Apple Inc.*

Co-Chair: *Mainak Biswas, Google*

65.1: **Deep Learning-Enabled Image Content Adaptive Driving Algorithm for Field Sequential Color LCDs with Mini-LED Backlight**
Qin Zong, Sun Yat-Sen University, Guangzhou, China

65.2: **A Light and Fast Branched Neural Network using Perceptual Optimization for High-Quality Visual Restoration of UDC images**
Jaihyun Koh, Samsung Display, Yongin, South Korea

65.3: ***Invited Paper:*** **Deep Learning-Based Image Enhancement for HDR Imaging**
Suk-Ju Kang, Sogang University, Seoul, South Korea

65.4: **Foveated Super Resolution Network for Virtual Reality Head Mounted Displays**
Hyoungsik Nam, Kyung Hee University, Seoul, South Korea

65.5: **AI based Simulation and Design Space Exploration for Pixel Layout**
Keuk Jin Jeong, Samsung Display Co., Ltd., Yongin, South Korea

Session 66: OLED Materials I *(OLEDs)*

Friday, May 13, 2022 / 9:00 AM - 10:20 AM / Room LL21EF

Chair: *Chihaya Adachi, Kyushu University*

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

66.1: ***Invited Paper:*** **Hole Transport Materials – Key Enablers Future OLED Display Evolution**
Jens Engelhart, Merck KGaA, Darmstadt, Germany

66.2: ***Invited Paper:*** **Delayed Fluorescence from Energetically Inverted Singlet and Triplet Excited States for Efficient Organic Light-Emitting Diodes**
Naoya Aizawa, Osaka University, Suita, Japan

66.3: **Active Learning for the Design of Novel OLED Materials**
Hadi Abroshan, Schrödinger Inc., Portland, OR US

66.4: **Understanding the Electron Injection/Transport Mechanism in OLEDs by Using a Superbase as Electron Injection Layer**
Tsubasa Sasaki, NHK Science & Technology Research Laboratories, Tokyo, Japan

Session 67: Flexible Displays *(Flexible Displays and e-Paper)*
Friday, May 13, 2022 / 9:00 AM - 10:20 AM / Room LL20BC
Chair: *Arokia Nathan, Darwin College, University of Cambridge*
Co-Chair: *Winston Wang, AU Optronics Corp*

67.1: **Comparison of In-Folding and Out-Folding Stress on Electrical Performance of Poly-Si TFTs on Polyimide Substrate for Foldable AMOLED Display**
Mohammad Billah, Kyung Hee University, Seoul, South Korea

67.2: ***Invited Paper:*** **Organic Thin-Film Transistor Flexible Hybrid Integration for Low-Power Ubiquitous Sensor Systems**
Xiaojun Guo, Shanghai Jiao Tong University, Shanghai, China

67.3: **Predicting The Impact Resistance of Flexible Display Panels based on Mo Thin Film Residual Stress**
Jung Hwa Park, Samsung Display Co., Ltd., Yongin, AL South Korea

67.4: **Research on Design and Lamination of 180° Curly CG**
Yang Yang, BOE OLED R&D Center, Chengdu, China

Session 68: Displays and Visual Performance *(Applied Vision)*
Friday, May 13, 2022 / 9:00 AM - 10:20 AM / Room LL20A
Chair: *Jennifer Gille, Consultant*
Co-Chair: *Youngshin Kwak, Ulsan National Institute of Science and Technology*

68.1: **Evaluation for Reaction Time of Gaming Displays**
Yan Jin, LG Display, Seoul, South Korea

68.2: **Considering the Effects of Display Persistence on Eye Movements and Readability in Virtual Reality**
T. Scott Murdison, Reality Labs at Meta, Redmond, WA US

68.3: **Importance of Individual Adaptation in Visually-Fidelitous Dynamic-Range Compression from HDR to SDR Images**
Saki Iwaida, Kagoshima Clinical Engineering College, Kagoshima, Japan

68.4: **A Text Legibility Improvement Method for OLED Devices**
Hyunkyung Song, Samsung Display Co., Ltd, Yongin, South Korea

Session 69: Materials and Processes for Flexible Displays *(Display Manufacturing)*
Friday, May 13, 2022 / 9:00 AM - 10:20 AM / Room LL20D
Chair: *Dr Robert Visser, Applied Materials*
Co-Chair: *Toshiaki Arai, JOLED Inc*

69.1: **Inkjet-Printable Optically Clear Silicone Resin for Display Fabrication**
Juyoung Yook, Dow Chemical Silicones Korea Co., Ltd, Jincheon, South Korea

69.2: **A Universal Method for the Lamination of Arbitrary Stretchable Substrate Pairs without Compromising the Elastic Properties of the Substrates**
Sung Gap Im, KAIST, Daejeon, South Korea

69.3: ***Invited Paper:*** **Opportunities for High Performance Display Manufacturing Enabled by OTFTs Using an 80 Degrees Celsius Maximum Process Temperature**
Simon Ogier, SmartKem, Sedgefield, United Kingdom

69.4: **Collimating and Recycling Linear Evaporation Source for AMOLED Mass Production**
Sungmoon Kim, DepoLab, Paju, South Korea

Session 70: Light-Field and Foveated Imaging for AR/VR/MR *(Hyper-Realistic Displays (AR/VR/MR) / Emerging Technologies and Applications / Liquid Crystal Technology)*
Friday, May 13, 2022 / 10:40 AM - 12:00 PM / Room 220B
Chair: *Gary Jones, Nanoquantum Corporation*
Co-Chair: *Akihiro Mochizuki, I-CORE Technology, LLC*

70.1: ***Distinguished Paper:*** **Foveated Imaging by Polarization Multiplexing for Compact Near-Eye Displays**
Kun Yin, University of Central Florida, Orlando, FL US

70.2: **A Design for Near Eye Light Field Display**
Jian Gao, BOE, Beijing, China

70.3: ***Invited Paper:*** **High Resolution Light Field VR LCD**
Yung-Hsun Wu, Innolux Corp., Miaoli County, Taiwan Roc

70.4: ***Invited Paper:*** **Light Field Displays for Reverse Passthrough VR**
Nathan Matsuda, Reality Labs Research, Meta, Redmond, WA US

Session 71: Projection Light Sources *(Display Systems)*
Friday, May 13, 2022 / 10:40 AM - 12:00 PM / Room 220C
Chair: *David Eccles*
Co-Chair: *Hidekazu Hatanaka, Ushio Inc.*

71.1: ***Invited Paper:*** **GaN-Based Watt-Class High-Power Edge-Emitting Lasers and Milliwatt-Class Vertical-Cavity Surface-Emitting Lasers**
Takuya Ozaki, Nichia Corporation, Anan, Japan

71.2: ***Invited Paper:*** **High Power Red Laser Diodes for Display Applications**
Satoshi Kawanaka, USHIO Inc., Shizuoka, Japan

71.3: **Static Laser Phosphor for Projectors with Rotating Tilted Mirror**
Kenneth Li, Optonomous Technologies Inc., Agoura Hills, CA US

71.4: **Laser Phosphor Light Source using Compound Reflectors for Projection Display**
Kenneth Li, Optonomous Technologies Inc., Agoura Hills, CA US

Session 72: Machine Learning for Failure and Artifact Detection *(Machine Learning for Displays / Display Manufacturing / Display Measurement)*

Friday, May 13, 2022 / 10:40 AM - 12:00 PM / Room LL21CD

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

Co-Chair: *Dr. Robert Visser, Applied Materials*

72.1: **In-Line Mura Detection Using Convolutional Neural Network in Display Manufacturing**
Satoru Tomita, Japan Display Inc., Chiba, Japan

72.2: **A Proposal for Image Compression Algorithm For Display Test Images**
Gang Xu, Jingce Electronics USA, San Jose, CA US

72.3: **Deep Learning Based Visual Defect Detection in Noisy and Imbalanced Data**
Qisen Cheng, Samsung Display America Lab, San Jose, CA US

72.4: ***Invited Paper:*** **Synthetic Defect Generation for Display Front-of-Screen Quality Inspection: A Survey**
Meng Cao, Apple, Cupertino, CA US

Session 73: OLED Materials II *(OLEDs)*

Friday, May 13, 2022 / 10:40 AM - 12:00 PM / Room LL21EF

Chair: *Jang Hyuk Kwon, Kyung Hee University*

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

73.1: ***Invited Paper:*** **Decoration Strategy in Para Boron Position: An Effective Way to Achieve Ideal Multi-Resonance Emitters**
Lian Duan, Tsinghua University, Peking, China

73.2: ***Invited Paper:*** **High Efficiency Organic Light-Emitting Diodes Based on Purely Organic Emitters**
Shi-Jian Su, South China University of Technology, Guangzhou, China

73.3: **Achieving Deep Blue Color in Diboron Embedded Multi-Resonance Thermally Activated Delayed Fluorescence Emitter for Narrowband OLEDs**
Kenkera Naveen, Kyung Hee University, Seoul, South Korea

73.4: **Novel Materials and Structures for High Efficiency and Long Lifetime Green Phosphorescent OLEDs in Automotive Applications**
Soojung Youn, Samsung Display, Yongin, South Korea

Session 74: Flexible Displays and Materials *(Flexible Displays and e-Paper)*

Friday, May 13, 2022 / 10:40 AM - 12:00 PM / Room LL20BC

Chair: *Kyung Cheol Choi, KAIST*

Co-Chair: *Simon Kang, Apple*

74.1: **31" Flexible Printed OLED TV Display Technology: It's TV Mobile**
Jueng Gil (James) Lee, Guangdong Juhua Printed Display Technology Co. Ltd., Guangzhou, China

74.2: ***Invited Paper:*** **Highly Reliable Dielectric interlayers for Flexible Displays and e-Paper**
Atsuko Yamamoto, Merck Electronics Ltd., Shizuoka, Japan

74.3: ***Invited Paper:*** **Getting Thinner and Thinner with a New Flexible platform - Challenges and Solutions for Flexible Displays**
Dong-Mee Song, *The Electronics Business of Merck KGaA ,Darmstadt, Germany*

74.4: **Development of Flexible Full-Color Mini-LED Display Using Simultaneous Transfer and Bonding (SITRAB) Technology**
Jiho Joo, Electronics and Telecommunications Research Institute, Daejeon, South Korea

Session 75: HDR and Color *(Applied Vision)*

Friday, May 13, 2022 / 10:40 AM - 12:00 PM / Room LL20A

Chair: *Sakuichi Ohtsuka, International College of Technology*

Co-Chair: *David Hoffman, Google*

75.1: **Brightness and Vividness of High Dynamic Range Displayed Imagery**
Luke Hellwig, Munsell Color Science Laboratory, Rochester, NY US

75.2: **Effect of Chromatic Aberration Correction on Visually Lossless Compression**
Sanjida Sharmin Mohona, York University, Toronto, ON Canada

75.3: **Field Sequential Color Displays with Simultaneously Suppressed Color Breakup and Flicker Based on Multi-Objective Optimization**
Qin Zong, Sun Yat-Sen University, Guangzhou, China

75.4: **Low Luminance JND and JNCD**
Sunyoung Park, Samsung Display, Yongin, South Korea

Session 76: Narrow Border Technologies *(Display Manufacturing)*

Friday, May 13, 2022 / 10:40 AM - 12:00 PM / Room LL20D

Chair: *Greg Gibson, nTact*

Co-Chair: *Winston Wang, AU Optronics Corp*

76.1: ***Invited Paper:*** **MicroLED Display with Tiling Technology**
Wen-Lung Chen, AU Optronics Corporation, Hsinchu, Taiwan Roc

76.2: **Development of Custom Shaped OLED Display**
Zhongyuan Wu, Hefei BOE Joint Technology Co., Ltd., Hefei, China

76.3: ***Invited Paper:*** **Slim Mini LED Backlight for HDR Compatible Mobile Displays**
Hisashi Watanabe, Sharp Display Technology Corporation, Tenri, Japan

76.4: ***Invited Paper:*** **Innovation Solutions That Lead to AMLED Technologies**
Minghua Xuan, Beijing BOE Display Technology Co., Ltd., Beijing, China

Poster Session

Thursday, May 12, 2022 / 5:00 PM - 8:00 PM / Room 220A

Active-Matrix Devices

P.1: **Uni-Color Column Line Pentile-Type Pixel Arrangement Design for Low Driving Power Consumption AMOLED Displays**
Sangmoo Choi, Google LLC, Mountain View, CA US

P.2: **Nitrogen Behaviors in PEALD-grown SiO2 Films Using N2O Plasma Reactant and Its Application in ALD-IZO TFTs**
Jin-Seong Park, Hanyang University, Seongdong, South Korea

P.3: **High Temperature Annealing Behavior of IGZO Using Plasma Enhanced Atomic Layer Deposition**
Jin-Seong Park, Hanyang University, Seongdong, South Korea

P.4: **A New Evaluation System for Metal Oxide Compound Semiconductor Film**
KookChul Moon, Gachon University, Seongnam, South Korea

P.5: **A New PWM Driving Circuit with Threshold Voltage and I-R Rise Compensating Capability for Mini-LED Backlight**
Chih-Lung Lin, National Cheng Kung University, Tainan, Taiwan Roc

P.6: **2731-ppi OLED Display with Low Power Consumption and Wide Viewing Angle Using OS/Si VLSI Process Technology**
Kiyotaka Kimura, Semiconductor Energy Laboratory Co., Ltd., Atsugi, Japan

P.7: **AMOLED Pixel Circuit for Strain Compensation in Stretchable Display**
Soo-Yeon Lee, Seoul National University, Seoul, South Korea

P.8: **Analysis on Degradation Mechanism of Oxide Semiconductor FETs with High Tolerance to Intense NBTIS**
Yukinori Shima, Semiconductor Energy Laboratory Co., Ltd., Tochigi, Japan

P.9: **Two-Mode PWM Driven Micro-LED Displays with Dual-Gate Metal-Oxide TFTs**
Jia Fu, Peking University, Shenzhen, China

P.10: **Emit Signals Reused Gate Driver Design for Ultra-Narrow-Bezel Micro-LED Display Based on Metal-Oxide TFTs**
Xin Zheng, Peking University, Shenzhen, China

P.11: **The Effects of Ar Dilution on N2O/SiH4 PECVD for the Growth of Silicon oxide Thin Films with Improved Breakdown Voltage Characteristics**
Aram Kim, LG Display, Paju, South Korea

P.12: **Exponential Dependence of Photocurrent on Reciprocal of Channel Length in Amorphous InZnO Thin-Film Transistors with Short Channel**
Jie Chen, Peking University Shenzhen Graduate School, Shenzhen, China

P.13: **Comprehensive Study of the TFTs Fabricated in the (100)-Oriented Grain-Boundary-Free Silicon Thin Film Obtained by Green CW-Laser Lateral Crystallization**
Nobuo Sasaki, Sasaki Consulting, Kanagawa, Japan

P.14: **Effects of Film Density on IGZO Based TFT Device Reliability**
Jaeyoon Park, LG Display, Paju, South Korea

P.15: **Charge Trap-Based Synaptic Transistor Employing In-Ga-Zn-O as Channel and Trap Layers for Bio-Inspired Neuromorphic Computing**
Junhyeong Park, Seoul National University, Seoul, South Korea

P.16: **A New a-IGZO TFT Pixel Circuit Compensating Threshold Voltage and Mobility for Active-Matrix OLED with Source Follower Method**
Ji-Hwan Park, Seoul National University, Seoul, South Korea

P.17: **Outstanding Image Sticking Performance via L-SWTFT Channel Tuning in AMOLED Display Application**
Yinglong Huang, BOE Optoelectronics Technology Co.,Ltd., Chengdu, China

P.18: **Low Voltage Oxide Transistor with High Dielectric Tantalum Oxide Gate Insulator by Thermal Oxidation of Tantalum**
Byung Seong Bae, Hoseo University, Asan, South Korea

P.19: **Performance Development of Oxide Semiconductor Photodiode with High Work Function Electrode Suitable for Mass Production**
Pengfei Gu, BOE Technology Group Co. Ltd, Beijing, China

P.20: **High Quality Self-Aligned Coplanar Thin-Film Transistors with SOG Materials for High Transparent AMOLED Display**
Wei Liu, BOE Technology Group Co., Ltd., BeiJing, China

P.21: **Indium-Gallium-Zinc Oxide Thin-Film Transistors for High-Resolution Active-Matrix Ferroelectric Liquid-Crystal Displays**
Sisi Wang, The Hong Kong University of Science and Technology, Kowloon, Hong Kong

P.22: **Effects of Self-Assembled Monolayer on Contact Resistance Between IGZO and Electrode for High-Resolution Display**
Yoonyoung Chung, POSTECH, Pohang, South Korea

P.23: **A Monolithically Integrated Artificial Compound Eye for Proximity Pattern Recognition**
Zhou Zhi Chao, Hong Kong University of Science and Technology, Hong Kong, Hong Kong

P.24: ***Distinguished Paper:*** **Gate Driver with LTPO TFT Circuits for Low Power Consumption and Narrow Bezel AMOLED Displays**
Jin Jang, Kyung Hee University, Seoul, South Korea

P.25: **Solution Processed CH3NH3PbI3/ZnO Phototransistor with High Photodetectivity**
Farjana Haque, Kyung Hee University, Seoul, South Korea

P.26: **AMOLED Pixel Circuit Compensating for Stretching and I-R Drop**
Hyuck Su Lee, Hoseo University, Asan, South Korea

P.27: **A Novel PWM Driving Pixel Circuit with Metal-Oxide TFTs for Micro-LED Display**
Ko-Ruey Jen, AU Optronics, Hsinchu, Taiwan Roc

P.28: **Development of Low Resistivity Gate Metal Process for LTPS TFTs Array Backplane Applications**
Jia-Hong Ye, AU Optronics Corporation, Hsinchu, Taiwan Roc

P.29: **Influence of the Static Bending Stress on LTPS TFT**
Shuang Guo, Hefei Visionox Technology Co., Ltd., Hefei, China

P.30: **Thermally Activated and Field-Enhanced Diffusion of Dopants in a-InGaZnO TFTs Under Circuit Operations and its Correlation to the Device Stabilities**
Chang Il Ryoo, Kookmin University, Seoul, South Korea

P.31: **Low Temperature of 150c Processed IGTO Thin-Film Transistor for Flexible Display Application**
Jae Kyeong Jeong, Hanyang University, Seoul, South Korea

P.32: **Investigation on Mechanism of Illumination Mura in AMOLED Display with LTPS TFT Backplane After Long Term Localized Illumination**
Enqing Guo, Visionox Technology Inc, Hebei, China

P.137: **High Performance Coplanar a-IGZO TFT Image Sensor with Partial Passivation-Less Structure for Digital X-Ray Detector**
Jaeho Yoon, LG Display Co., Ltd., Paju, South Korea

P.139: **Process Simulation Reflecting Hydrogen/Oxygen for Oxide Semiconductor Thin Film Transistor**
Kihwan Kim, Samsung Display, Yongin, South Korea

P.140: **WITHDRAWN**

P.141: **Modulation of Subthreshold Current in In-Ga-Zn-O Thin-film Transistor for OLED Display using Electrohydrodynamic Jet Printing**
Hyun Jae Kim, Yonsei University, Seoul, South Korea

Applied Vision

P.33: **Measuring Color Strength for Wide Color Gamut OLEDs**
YungKyung Park, Ewha Womans University, Seoul, South Korea

Automotive/Vehicular Displays and HMI Technologies

P.34: Automotive Local dimming Integrated System for LCD MDL
Xiaoxia Wang, BOE Optoelectronics Technology Co., Ltd., Beijing, China

P.35: The Study of Vehicle Bright Backlight with Local Dimming Effect
Yuanyuan Zhu, BOE Optoelectronics Technology Co., Ltd., Beijing, China

P.144: The Effect of the Reference Image on the Side Window of the Car of Motion Sickness
Chien Ju Li, Industrial Technology Research Institute, Hsinchu, Taiwan Roc

P.145: AR HUD System Realized By Holographic Display Technology
Chien Yu Chen, National Taiwan University of Science And Technology, Taipei, Taiwan Roc

Display Electronics: Display Driving Technology

P.36: WITHDRAWN

P.37: Adaptive Frequency Driving Scan Driver with NOR Logic Gate Based on a-InGaZnO TFTs
Hojin Lee, Soongsil University, Seoul, South Korea

P.38: Low-Power a-IGZO TFT Shift Register Featuring i-PUA Gate Dielectric
Hojin Lee, Soongsil University, Seoul, South Korea

P.39: The IR Drop Compensation Method of AMOLED Display for Dynamic Power Control
Wei-Jhe Ma, Novatek Microelectronics Corp., Hsinchu, Taiwan Roc

P.40: Techniques of Touch Sensing and Display Driving for Avoiding Display Artifacts for Flexible OLED Applications
Daisuke Ito, Synaptics Japan G.K., Nakano, Japan

P.41: A Combined PAM / PWM Driving Scheme for High Uniformity of Micro-LED Displays
Julian Ritter, Saarland University, Saarbrücken, Germany

P.42: A New Integrated Scan/Emission Driver Circuit with Progressive Emission Driving Method for Micro-LED Display
Sung-Hyuck Ahn, Sungkyunkwan University, Suwon, South Korea

P.43: Finely Programmable Pulse Width Shift Register for Luminance Control of AMOLED Displays
Hyoungsik Nam, Kyung Hee University, Seoul, South Korea

P.44: MPRT Enhancement Gate Driver Circuit Employing IGZO TFTs for Image-Quality Improvement
Xuehuan Feng, Hefei BOE Joint Technology Co. Ltd., Hefei, China

P.45: High Efficiency DC-DC Converter for IT OLED Displays
Yoon-Young Lee, Samsung Display, Yongin, South Korea

Display Manufacturing

P.46: New Type of Unbounded Screen Full-Attachment TV Set
Wenbo Dong, Hefei BOE Display Technology Co., Ltd., Hefei, China

P.47: A Repair Method for Improving Pad Damage of COG Mini-LED
Hai Tang, BOE MLED Technology Co., Ltd., Beijing, China

P.48: Analysis of Degree of Imidization of Polyimide Organic Film Through Retardation Measurement
Nakcho Choi, Samsung Display Co., Ltd., Yongin, South Korea

P.49: Physics-Based Simulator for Predictictiin of Organic Layer Profile Using Microfluidics
Hyungkeon Cho, Samsung Display, Yongin, South Korea

P.50: Inkjet Printing Design and Analysis for Thin and Uniform Organic Encapsulation Layer on OLEDs
Heechang Yoon, Samsung Display Co., Ltd., Gyeonggi, South Korea

P.51: Study on the Sealing Property of Narrow Border Display
Zhenyu Zhang, Hefei Xinsheng Photoelectric Technology Co., Ltd., Hefei, China

P.52: Novel Forming Technology of 3D Cover Glass with Induction Heating System for Curved-Corner Display
Seungho Kim, Samsung Display Co., Ltd., Yongin, South Korea

P.53: A Study on Conceptual Design in Foam Tape of Curved Display using Topology Optimization
Min Gu Kim, Samsung Display Co., Ltd,, Yongin, South Korea

P.54: Development of Heat Free / Low Temperature Process High Refractive Index Materials for Display
Kazuki Urakawa, Tokyo Ohka Kogyo Co., Ltd., Kanagawa, Japan

P.55: Development of Photosensitive Material for Mini/Micro LED Display
Yasunori Takahashi, Sumitomo Bakelite Co., Ltd., Fukuoka, Japan

P.142: Cost of Operation Reduction and Performance Improvement of Crystallized a-Si Backplanes for OLED-Displays by Solid-State-Laser Annealing (SLA)
Hans-Juergen Kahlert, INNOVAVENT GmbH, Goettingen, Germany

Display Measurement

P.56: Simulation and Improvement of TCO Luminance Angular Uniformity Based on Techwiz and LightTools Software
Hanyan Sun, Beijing BOE Display Technology Co., Ltd., Beijing, China

P.57: Improved Modulation Transfer Function (MTF) for Aerial Image Formed with AIRR by Use of Two Transparent Spheres
Kazuaki Takiyama, Utsunomiya University, Utsunomiya, Japan

P.58: Measurement of AR Displays in Positioning Accuracy
Xi Mou, Hangzhou Santest Technology Co., Ltd., Zhejiang, China

P.59: In-Fab Raman Spectroscopy for Defect Analysis of Random Failures
Yong-Woon Lim, Samsung Display, Yongin, South Korea

Display Systems: Emerging Display Technologies and Applications

P.60: New Flexible & Lightweight RGB LED Video-Foil for Digital Signage
Florian Kall, LightnTec GmbH, Karlsruhe, Germany

P.61: Dual Cell Display System for Intelligent Viewing-Adjustable LCDs
Yuxu Geng, Chongqing BOE Optoelectronics Technology Co., Ltd., Chongqing, China

P.62: Adaptive Pixel-Based Local Color Uniformity Compensation for AMOLED Displays
Wan-Nung Tsung, Novatek Microelectronics Corporation, Hsinchu, Taiwan Roc

Display Systems: Projection

P.63: **Design and Fabrication of Wide-Viewing-Angle Ambient Light Rejection Front Projection Screen**
Fung-Hsu Wu, BenQ Materials Corp., Taoyuan, Taiwan Roc

Display Systems: VR/AR/MR Technologies

P.64: **The Micro-LC Lens for 2D/3D Switchable Displays**
Weili Zhao, BOE Technology Group Co., Ltd., Beijing, China

P.65: **Autostereoscopic Display for Two Viewers Providing Images Specific to Each Viewpoint**
Hideki Kakeya, University of Tsukuba, Tsukuba, Japan

P.66: **Application of Ergonomics in VR HMD Exit Pupil Positioning Design**
Yuhong Liu, Beijing BOE Optoelectronics Technology Co., Ltd., Beijing, China

P.67: **Design and Analysis of Deflection Structure for Light Field Display**
Kai Siang Hsu, National Taiwan University, Taipei, Taiwan Roc

P.68: **A Miniaturized Polarization-Multiplexed Dual-Plane Head-Mounted Display System for Augmented Reality**
Zekun Yan, Shanghai Jiao Tong University, Shanghai, China

P.69: **Omnidirectional and Self Adaptive High Dimensional 3D Display**
Shiming Shang, BOE Technology Group Co., Ltd., Beijing, China

Emerging Technologies and Applications

P.70: **Force Variation During Tactile Exploration Provide Crucial Information in Virtual Tactile Experience**
Youru Chen, BOE Technology Group Company, Ltd., Beijing, China

P.71: **Methods for Adopting High Resolutions Mobile Displays in Alternative Applications, Products and Markets**
Grant Jennings, Gowin Semiconductor, Austin, TX US

P.72: **Highly Uniform Speckle Pattern Created Via an Elastomeric Stencil Mask for High-Precision Digital Image Correlation Analysis of Substrate Stretching Deformation**
Yongtaek Hong, Seoul National University, Seoul, South Korea

Emissive, Micro-LED, and Quantum-Dot Displays: Micro-LEDs

P.73: **MicroLED Pixel Circuit Based on Metal Oxide Thin-Film Transistor with Progressive Emission Method Using Pulse Width Modulation**
Eun Kyo Jung, Sungkyunkwan University, Suwon, South Korea

P.74: **High Efficiency µLED Light Engine for AR/VR Displays**
En-Lin Hsiang, University of Central Florida, Orlando, FL US

P.75: **MicroLED Pixel Circuit Capable of Always on Display Mode Operation for Mobile and Wearable Displays**
Yong-Hoo Hong, Sungkyunkwan University, Suwon, South Korea

P.76: **Elimination of Nanorods by Tetramethylammonium Hydroxide for the Fabrication of AlGaN-based UV-C Micro-LED Array**
Feng Feng, Hong Kong University of Science and Technology, Hong Kong, Hong Kong

P.77: **Advanced Encapsulation Film for Micro-LED Display**
Shih-Chieh Teng, BenQ Materials Corporation, Taoyuan, Taiwan Roc

P.78: **Atomic-Scale Sidewall Passivation for MicroLED Devices**
Jouko Lång, Comptek Solutions, Turku, Finland

P.79: **WITHDRAWN**

P.80: **Design Heuristics for Low Operating Voltage xLEDs**
Khaled Ahmed, Intel Corporation, San Jose, CA US

Emissive, Micro-LED, and Quantum-Dot Displays Posters: QD Color Conversion

P.81: **Enhanced Color Conversion Efficiency of Quantum Dot Layer using Low Refractive Index Layer**
Da Bin Kim, Foundation Technology Laboratory, LG Display, Seoul, South Korea

P.82: **Prediction Methodology for the Optical Properties of QDs with Arbitrary 3D Shape**
Hyunguk Cho, Samsung Display, Youngin, South Korea

P.83: **Oxygen Ratios Effect on the Photoluminescence Property of Zinc Oxide Thin Film Phosphor**
Chaoyang Li, Kochi University of Technology, Kochi, Japan

P.84: **Selective Coating CdSe/ZnS Quantum Dots on Stretchable Substrate with Controlled Density by Inducing Ligand Exchange Reaction**
Yongtaek Hong, Seoul National University, Seoul, South Korea

P.85: **Nanorod Down-Converted LED with Long Term Stability for Display Backlight**
Chengbin Kang, The Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong

P.86: **Ink-Jet Printed Stable Full-Color Perovskite and Quantum Rod Color Filter**
Yiyang Gao, The Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong

Emissive, Micro-LED, and Quantum-Dot Displays Posters: QD-LEDs

P.87: **Localized Surface Plasmon Resonance-Enhanced ZnSeTe Blue Quantum Dot Light-emitting Diodes with AuAg Alloy Nanoparticles**
Heesun Yang, Hongik University, Seoul, South Korea

P.88: **Efficiency Improvement of Top-Emission Green Quantum Dot Light-Emitting Diode with Dielectric-Metal-Dielectric Cathode**
Jiun-Haw Lee, National Taiwan University, Taipei, Taiwan Roc

P.89: **High-Efficiency Red Quantum Dot Light-Emitting Diodes with Acrylate-Treated ZnMgO as an Electron Transport Layer**
Heesun Yang, Hongik University, Seoul, South Korea

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Maocheng Jiang, BOE Technology Group Co., Ltd., Beijing, China

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