

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MIANYANG BOE OPTOELECTRONICS TECHNOLOGY CO., LTD.; WUHAN
CHINA STAR OPTOELECTRONICS SEMICONDUCTOR DISPLAY
TECHNOLOGY CO., LTD.; TIANMA MICROELECTRONICS CO. LTD.; AND
VISIONOX TECHNOLOGY, INC.
Petitioner,

v.

SAMSUNG DISPLAY CO., LTD.
Patent Owner.

Case No. IPR2023-00941
U.S. Patent No. 7,414,599

DECLARATION OF MR. THOMAS L. CREDELLE

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I. INTRODUCTION

1. I have been retained as an expert by Petitioner Mianyang BOE Optoelectronics Technology Co., Ltd., Wuhan China Star Optoelectronics Semiconductor Display Technology Co., Ltd., Tianma Microelectronics Co. Ltd., and Visionox Technology, Inc. in the above-captioned matter as an independent consultant to offer opinion related to U.S. Patent No. 7,414,599 (the “’599 patent”).

2. Specifically, I have been asked to provide my opinion regarding the qualifications of a person of ordinary skill in the art (“POSITA”) for the ’599 patent.

3. If requested, I am prepared to further explain (in a deposition or at a trial before the Patent Trial and Appeal Board (the “Board”)) my opinions and the bases thereof. Should Samsung Display Company, Ltd. (“Patent Owner”) or its expert disagree with my opinions, I am also prepared to testify in rebuttal to such a disagreement.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

4. My qualifications to testify as an expert in electronics technology generally and organic light emitting devices (“OLED”) specifically are set forth in my *curriculum vitae* attached as Appendix A, which includes a listing of cases in which I have provided expert testimony.

5. As shown in my *curriculum vitae*, I have devoted my career to the research and development (“R&D”) and product engineering of flat panel displays

and materials/optics/electronics for flat panel displays and touch sensors. I have over 20 years of experience in active-matrix liquid crystal display (“LCD”) R&D, starting in 1983 at RCA Labs and continuing at GE. I led the product development of active-matrix LCDs for notebook computers at Apple in the early 1990s and had close collaboration with many LCD developers in Asia. Later in my career, I made significant contributions to the design and implementation of new pixel architectures for LCDs and OLEDs while at Clairvoyante. Both efforts involved Thin Film Transistor (“TFT”) design modifications to achieve the desired goals of high pixel transmission and reduced circuit complexity. The contributions I made to advanced pixel architectures (“Pentile Matrix”) and related circuit design optimization at Clairvoyante led to a decision by Samsung to acquire the intellectual property in 2007. More recently, I have been involved in several patent litigation cases which required a detailed knowledge of TFT design, materials, and processing for both LCD and OLED.

6. I am currently the President of TLC Display Consulting and split my time between technical consulting and patent litigation support.

7. I received my M.S. degree in Electrical Engineering from the Massachusetts Institute of Technology in 1970, with an emphasis on Electro Optics and Solid State Materials. I received my B.S. degree in Electrical Engineering in 1969 from Drexel University.

8. I was employed by RCA at Sarnoff Labs in Princeton, NJ from 1970 through 1986, at first as a Member of the Technical Staff and later as a Group Manager in charge of all active-matrix LCD research. During my time at RCA, I participated in R&D projects relating to optical materials and flat panel displays, including LCD devices. In 1983, I established the TFT LCD Program at Sarnoff Labs. As a Group Manager, I led a project that resulted in the development of the first polysilicon TFT LCD at Sarnoff Labs. I received the Sarnoff Outstanding Achievement Award for Large Area Flat Panel TV Developments.

9. From 1986 to 1991, I was employed by GE as the Manager of TFT LCD Research and Development at the GE Research and Development Center in Schenectady, NY. My duties included contributing to and managing R&D efforts relating to TFT and LCD technology for avionics applications. At GE, I led the team that built the world's first one-million-pixel color LCD device. I also led development of numerous other display devices utilizing LCD technology.

10. From 1991 to 1994, I was employed by Apple Computer as the Manager of Display Engineering. In my role at Apple, I supervised all TFT LCD design (in-house and at vendors), engineering, and qualification for the first PowerBook notebook computers introduced to market in the United States. A key part of my effort was the evaluation and development of active-matrix LCDs with improved performance, such as viewing angle, contrast ratio, and uniformity.

11. From 1994 to 1996, I was employed as the Director of Advanced Product Marketing by Allied Signal, where I was involved with the design and engineering of optical films and custom focusing backlight designs for improving the viewing angle performance of LCD devices.

12. From 1996 to 1999, I was employed as the Director of Product Marketing for Motorola's Flat Panel Display Division, where I worked in the development of new flat panel technology. I also worked closely with Motorola groups responsible for integrating TFT LCD technology into mobile phone products.

13. From 1999 to 2001, I served as the Vice President of Operations at Alien Technology Corporation. During my time at Alien Technology, I was involved with the design and architecture of drive electronics packaging technology suitable for flexible display devices.

14. From 2001 to 2007, I served as the Vice President of Engineering for Clairvoyante, Inc. My responsibilities included managing research, development, engineering, and marketing of technologies for improving the resolution and power consumption of color flat panel displays, which required significant changes to the active-matrix layout. During my time at Clairvoyante, I was therefore heavily involved with the design of the active-matrix array and the LCD/OLED pixel circuit and driving circuitry. My work resulted in the issuance of multiple patents relating to TFT LCD and TFT OLED display technology.

15. From 2007 to 2008, I served as the Senior Vice President of Engineering for Pureddepth, Inc. My responsibilities included the design of hardware and software to create 3D images on TFT LCDs.

16. From 2012 through 2015, I served as the Vice President of Application Engineering and Device Performance for Innova Dynamics, Inc., a nanotechnology company developing materials to be used in LCDs and touch sensors. In that effort, I led the collaboration with major capacitive touch sensor makers to replace brittle Indium Tin Oxide (“ITO”) transparent conductors with silver nanowire conductors, which are compatible with flexible touch sensors. We successfully fabricated flexible capacitive touch sensors that could be bent without breaking.

17. In 2008, I founded TLC Display Consulting, a company that provides technical consulting in the areas of flat panel displays, LCDs, OLED, touch sensors, LEDs, and related electronics. I currently serve as the President of TLC Display Consulting.

18. I have been an active member of the Society for Information Display (“SID”) for over 40 years, having attended every SID Annual Technical Symposium since 1972. I was a member of the SID’s Program Committee for 15 years, and the Director of the SID’s Symposium Committee for 10 years. In 1984, I was awarded the title of Fellow of the Society for Information Display in recognition of my achievements and contributions to flat panel display technology.

19. I am a named inventor on over 80 U.S. patents relating to flat panel display, LCD, and OLED technology. I have authored several articles relating to LCD technology and flat panel displays that were published by industry periodicals, such as Information Display, and peer reviewed journals, such as the SID's Digest of Technical Papers.

20. My *curriculum vitae* contains further details regarding my experience, education, publications, and other qualifications that allow me to render expert opinions in connection with this proceeding.

III. COMPENSATION

21. I am being compensated for my services in this proceeding at an hourly rate for consulting services of \$500. My compensation is not contingent upon the opinions I render or the outcome of this proceeding.

IV. MATERIALS CONSIDERED

22. Among the materials I have reviewed in forming my opinions are the following:

Exhibit	Description
EX1001	U.S. Pat. 7,414,599 (Chung)
EX1002	U.S. Pat. Pub. 2003/0132931 (Kimura)

Exhibit	Description
EX1005	File History for U.S. Pat. 7,414,599
Paper 12	The Board's Decision Granting Institution
Paper 14	Patent Owner's Objections to Evidence

23. I reserve the right to rely upon additional materials as I become aware of them, and to revise my analysis and opinions to the extent necessary based on any such new materials, and file supplementary declarations as necessary to explain my conclusions and opinions as per their bases on these new materials.

24. My opinions are based in part on my review and analysis of the above-mentioned documents and materials. I have also relied on my education, experience, and knowledge of basic engineering principles, electronics technology, OLED, and pixel circuits.

V. SUMMARY OF OPINIONS

25. I agree with Petitioner's statement of the level of ordinary skill in the art, which the Board preliminarily adopted:

A person of ordinary skill in the art ("POSITA") in the technology field of the '599 patent would have had a Bachelor's degree in electrical engineering or similar discipline, along with 2–3 years of circuit design/analysis experience. Lack of work experience can be remedied by additional education, and vice versa.

Paper 12 at 12 (internal citation omitted).

VI. UNDERSTANDING OF THE LAW REGARDING THE LEVEL OF ORDINARY SKILL IN THE ART

26. I am not an attorney. For purposes of this declaration, I have asked Petitioner's counsel for an explanation of certain legal principles and aspects of the law that would be relevant to my opinions.

27. I have used my understanding of those principles in forming the opinions set forth in this declaration. My understanding of those principles is summarized below.

28. I have been informed and understand that the level of ordinary skill in the art at the time of the invention is relevant to inquiries such as the meaning of claim terms, the meaning of disclosures found in the prior art, and the reasons a POSITA may have for combining references.

29. I have been informed and understand that factors that may be considered in determining the level of ordinary skill include: (1) the education of the inventor; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) education level of active workers in the relevant field. I have been further informed and understand that a POSITA is also a person of ordinary creativity.

30. In my opinion, a POSITA in the technology field of the '599 patent would have the level of ordinary skill quoted above in the Summary of Opinions.

31. I understand that the Patent Owner asserts that the level of ordinary skill must include “experience in active matrix display design.” Paper 14 at 1. I disagree.

32. Experience in active-matrix display design is not necessary to understanding the '599 patent. While set in the context of OLED displays, the '599 patent and the relevant prior art are directed to transistor circuits, which were quite simple and well known at the priority date of the '599 patent (which counsel has instructed me to assume is July 7, 2003).

33. For example, the '599 patent, while directed to a pixel circuit comprising an electroluminescent element, e.g., an OLED, the electroluminescent element has a routine and well-understood role in the circuit — nothing more than being coupled between a transistor and a power supply and emitting light when a current flows through it. The remainder of the circuit comprises transistors and a capacitor, and it is the structure and operation of these transistors and capacitor on which the patent focuses. A POSITA with the qualification under my opinion would have been able to understand the principles of the embodiments of the patent and practice the art, e.g., through its description of the technology background. As a more specific example, the purported advantages of the embodiments of the '599 patent, “self-compensating the threshold voltage deviation in the driving

transistor . . . [and] solv[ing] a charging problem in the data line,” are a result of transistor circuit design and do not require experience in active-matrix display design. *See* EX1001, 8:39-44 (the purported advantage). The purported advantages are accomplished through the arrangement of transistors and a capacitor, which is a matter of circuit design that would be similar to circuit problems in other fields unrelated to displays. A POSITA with the qualification under my opinion would have been able to understand the principles of the embodiments of the ’599 patent and practice the art and would be better suited to practice the technology of the ’599 patent than an engineer with experience in active-matrix display design but little knowledge of transistor circuits.

34. Further, as the Board has noted, this level of ordinary skill in the art is “consistent with what is reflected by the content of the applied prior art references.” Paper 12 at 12. I agree with that assessment based on my review of the primary reference Kimura (EX1002). Moreover, based on my experience, I am confident that other prior art references are consistent with this level of ordinary skill in the art.

35. In my experience managing the R&D of various active-matrix displays, I would assign the design of pixel circuits to good circuit designers, regardless of their experience with displays, rather than an engineer with experience in display technologies but little experience of transistor circuits. I would provide such circuit

designers a short overview of the display architecture in, *e.g.*, a 1–2 hour meeting, so they understand the context of what they are designing, which was more than sufficient for them to do their work.

36. By 2003, I had taken on various R&D activities and senior management positions, including Vice President of Engineering, working on flat panel displays. I would have considered an electrical engineer with 2–3 years of circuit design/analysis experience to be qualified to work on the subject matters of the '599 patent and would have hired such a person to work on them. I would have preferred such an engineer over another who has active-matrix display experience but little understanding of or experience with transistor circuit design.

37. At all relevant times, I qualified as a POSITA. Further, although my level of skill is now considerably beyond that, I can and do objectively address the relevant material from the perspective of a POSITA as of the priority date in the preparation of this declaration.

VII. CONCLUDING REMARKS

38. I understand that additional information may be forthcoming that may require me to amend or supplement my opinions. I reserve the right to do so, and will do so in a timely manner should a response to any additional information be warranted.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Executed this 11th day of January, 2024, in Powell Butte, OR.



Thomas L. Credelle

APPENDIX A

Thomas L. Credelle Curriculum Vitae

Professional Summary

Mr. Credelle is a recognized expert in the flat panel/touch industry with over 40 years of expertise in all aspects of flat panel displays, LEDs, LED displays, and optics. He has made significant contributions in the areas of R&D, engineering, marketing, and senior management. He has served at an executive level at start-up businesses within major corporations and start-up companies in Silicon Valley and has had extensive interaction with flat panel producers and customers in Japan, Taiwan, Korea and China. Mr. Credelle holds 84 issued US patents in various flat-panel related technologies including display design, display electronics, materials, algorithms, systems, RFID, and optics, with additional pending.

Mr. Credelle is a Fellow of the Society for Information Display and currently consults regarding technology, business, and patent issues involving Flat Panel Display and LED Technology for various companies. He has written expert-analysis reports for private clients on patent portfolios of over 500 patents and has written numerous IPR ITC, and District Court Case reports and has given depositions on many. He has testified in two District Court cases and two ITC Hearings.

Expertise

- Flat Panel Display Technology
- LEDs and LED lighting
- Display electronics
- Electro-optics
- Patent analysis
- Expert witness (reports, testimony)
- TFT and Liquid Crystal Display R&D

Education

<u>Year</u>	<u>College or University</u>	<u>Degree</u>
1970	Massachusetts Institute of Technology	M.S., Electrical Engineering Emphasis: Electro-optics and Solid State Physics Thesis: "Optical Properties of High Purity Stannic Oxide"
1969	Drexel University	B.S., Electrical Engineering (Honors Program)

Thomas L. Credelle
Curriculum Vitae

Professional Experience

- From: 2008
To: Present
Organization: **TLC Display Consulting**
Title: President
Summary:
 - Technical consulting in the field of flat panel displays, LEDs, and display electronics
 - Business/patent consulting in the fields of displays, LEDs, optics, new technology
- From: 2016
To: 2018
Organization: **RealD**
Title: Acting CEO, RealD Me (2016-2017), Strategic Advisor, RealD 2017-2019)
Summary:
 - Business and technical advisor to RealD Intelligent Backlight Business Unit
- From: 2012
To: 2016
Organization: **Innova Dynamics, Inc.**, San Francisco, CA
Title: VP, Application Engineering and Device Performance
Summary:
 - Primary interface between customer and product engineering
 - Testing and qualification of all products
 - Business development/technical contact for new opportunities
- From: 2008
To: 2018
Organization: **Display Engineering, Inc.** San Jose, CA
Title: Contractor
Summary:
 - Design and testing of high-brightness LED backlights for outdoor signage
 - Circuit design and thermal analysis of LED light bars
 - Developed new methods for passive cooling of LED light sources

Thomas L. Credelle Curriculum Vitae

From: 2007
To: 2008
Organization: **Puredepth, Inc.**, Redwood City, CA and Auckland, NZ
Title: Senior VP Engineering
Summary:

- Recruited to establish first senior management leadership position for hardware and software engineering related to Puredepth's Multi Layer Display (MLD) technology.
- Rapidly learned details of technology, established new development plans, and supported customer engagements in US, Korea, and Japan.
- Divided time between US and NZ offices, supporting sales/marketing and leading engineering effort.

From: 2001
To: 2007
Organization: **Clairvoyante, Inc.**, Cupertino, CA
Title: VP Engineering
Summary:

- Responsible for engineering, product development, product roadmap, marketing of technology that improves resolution and reduces power of color flat panel displays.
- Responsible for applied R&D, IC development, customer training and support for all technology integration programs.
- Creation of new intellectual property to advance adoption of Clairvoyante technology.
- Monthly interaction with leading LCD producers in Taiwan, Korea, Japan; management of all vendors relating to product development (8-10 on-site visits per year).

From: 1999
To: 2001
Organization: **Alien Technology Corporation**, Morgan Hill, CA
Title: VP of Operations
Summary:

- Key member of management team to develop novel technology for nanoblock-IC assembly using fluidic process. Responsible for facilities, manufacturing operations, IT, and HR; managed \$20M construction project for mfg.
- Key contributor to display-related use of Alien manufacturing processes.
- Contributed to patent portfolio for Alien with key inventions in Nanoblock™ IC manufacturing techniques for displays and RFID tags.

Thomas L. Credelle Curriculum Vitae

From: 1996
To: 1999
Organization: **Motorola**, Flat Panel Display Division, Tempe, AZ
Title: Director, Product Marketing
Summary:

- Responsible for establishing market direction and initial sales approach for new Field Emission Displays (FED) under development within the Division.
- Won potential business for initial small FEDs in industrial and automotive applications.
- Established and managed marketing communications department, creating new brand image for product as well as managing all trade show activities.
- Contributed to product development and spec generation. Generated patent disclosures aimed at solving customer-related issues.

From: 1994
To: 1996
Organization: **Allied Signal**, Los Gatos, CA
Title: Director, Advanced Product Marketing
Summary:

- Responsible for establishing product marketing direction and establishing customer contacts for newly-developed optical films for viewing angle enhancement for LCDs.
- Participated in product development, product improvement based on customer input.

From: 1991
To: 1994
Organization: **Apple Computer**, Cupertino, CA.
Title: Manager, Display Engineering
Summary:

- Responsible for all LCD engineering and qualification for first PowerBook notebook computers introduced to market.
- Extensive interaction with Asian suppliers.
- Generated patent disclosures related to LCD integration in notebook PCs

Thomas L. Credelle Curriculum Vitae

From: 1986
To: 1991
Organization: **GE** R&D Center, Schenectady, NY
Title: Manager, TFT LCD Research and Development
Summary:

- Managed R&D in TFT and LCD technology for avionics applications. Led the team that built the first 1 million pixel color LCD. Led development of various optical devices based on liquid crystal materials.
- Established photonics effort based on liquid crystal technology.

From: 1970
To: 1986
Organization: **RCA** Sarnoff Labs, Princeton, NJ
Title: Individual Contributor, then Group Manager
Summary:

- Increasing levels of responsibility in the R&D of optical materials and flat panel displays.
- Key contributor to novel methods for large screen flat panel TFT.
- Established TFT LCD Program at Sarnoff Labs in 1983.
- Led development of first polySi TFT LCDs at Sarnoff Labs.

Legal Consulting

Expert Engagement:

Type of Matter: Deposition on patent dispute
Client: Alien Technology
Case Name: Alien v. Avery, Case No. 08-cv-00795
Services Provided: Deposed as expert and inventor on behalf of Alien
Date: October 29, 2008

Expert Engagement:

Type of Matter: Patent Infringement, LCD Projection
Client: McKenna Long & Aldridge LLP
Case Name: Undisclosed
Services Provided: Non-testifying expert on ITC case
Date: November 2011

Thomas L. Credelle Curriculum Vitae

Expert Engagement:

Type of Matter: LCD backlight
Client: Steptoe and Johnson LLP on behalf of LG
Case Name: In the Matter of Certain Devices for Improving Uniformity Used in a Backlight Module and Products Containing the Same Inv. No. 337-TA-805
Services Provided: Non-testifying expert on ITC case (settled)
Date: November 2011

Expert Engagement:

Type of Matter: Display driving method for eBooks
Client: Klarquist Sparkman LLP on behalf of Amazon (v. Positive Technologies)
Case Name: 2:11-cv-2226, N.D. Calif.
Services Provided: Expert Reports, Testifying Expert (settled)
Date: October 2012 – April 2013

Expert Engagement:

Type of Matter: Display driving method for eBooks
Client: Alston and Bird LLP on behalf of Barnes and Noble (v. Positive Technologies)
Case Name: 3:11-cv-02226-SI
Services Provided: Testifying expert on District Court Case (settled) Non infringement and non-enablement reports written.
Date: March 2013 – July 2013

Expert Engagement:

Type of Matter: LCD driving method
Client: Kenyon and Kenyon LLP on behalf of Sony (v. Surpass)
Case Name: IPR2015-0863
Services Provided: IPR Reports and Deposition
Date: Jan 2015-Mar 2016

Expert Engagement:

Type of Matter: LCD Optics and TFT design
Client: Marc Labgold on behalf of Funai (v. Gold Charm Ltd.)
Case Name: IPR2015-01448
Services Provided: IPR Report
Date: Apr, 2015 – Jul, 2015

Expert Engagement:

Type of Matter: LCD Backlights using LEDs
Client: Shearman & Sterling LLP/Fried Frank LLP on behalf of Mercedes Benz (v. Innovative Display Technologies)
Case Name: IPR2015-01995, IPR2015-01115, IPR2015-01113 and 2: 14-cv-00535 TXEDC
Services Provided: IPR Expert Reports
Date: Mar 2015 – May 2015

Thomas L. Credelle Curriculum Vitae

Expert Engagement:

Type of Matter: TFT array and LCD panel interconnect
Client: Covington & Burling on behalf of Samsung Display Co. (v. MiiC & Partners)
Case Name: IPR205-01469, IPR2015-01499
Services provided: IPR Expert Reports
Date: May 2015- Mar 2016

Expert Engagement:

Type of Matter: LCD Backlights using LEDs
Client: Mayer Brown on behalf of KJ Pretech (v. Innovative Display Technologies)
Case Name: IPR2015-01866, IPR2015-01867, IPR2015-01868
Services Provided: IPR reports and depositions (3)
Date: Aug 2015-Jun 2016

Expert Engagement:

Type of Matter: LCD backlights using LEDs
Client: Gibson, Dunn, and Crutcher LLP on behalf of Vizio (v. Delaware Display Group LLC)
Case Name: Case No. 13-cv-2112
Services Provided: Non-infringement Report, Deposition, Testifying Expert (settled)
Date: Sep 2015-Mar 2017

Expert Engagement:

Type of Matter: LCD manufacturing, TFT array design
Client: Sughrue Mion PLLC on behalf of TCL
Case Name: Arbitration (Hong Kong) between AUO and TCL
Services Provided: Non-infringement analysis of TFT array design (settled)
Date: Jun 2017 – Sep 2017

Expert Engagement:

Type of Matter: LED display panels
Client: Adduci Mastriani & Schaumberg on behalf of Ultravision Technologies LLC (v. >20 Chinese companies)
Case Name: ITC Case 337-TA-1114
Services Provided: Expert Reports (Invalidity and Non-infringement) and Deposition (3 days)
Date: Jan 2018 – Feb, 2019

Expert Engagement:

Type of Matter: LCD gamma circuit
Client: K&L Gates on behalf of Wistron (v. plaintiff Phenix Longhorn)
Case Name: IPR2018-01255, 2:17 cv-00711 TXEDC
Services Provided: Expert report and Expert Testimony as needed (settled)
Date: May 2018 – Jun 2019

Thomas L. Credelle
Curriculum Vitae

Expert Engagement:

Type of Matter: LED packaging
Client: Davidson, Berquist, Jackson & Gowdey, LLP on behalf of Document Security Systems (v. defendants Seoul Semiconductor, Nichia Corp, Cree, Inc., Everlight Electronics)
Case Name: IPR2018-00966, 2018-01165
Services Provided: Expert Reports, Depositions (2) and Expert Testimony at trial as needed
Date: June 2018 – May 2019

Expert Engagement:

Type of Matter: TFT-LCD technology
Client: Vinson and Elkins on behalf of AUO (v. plaintiff Vista Park Ventures)
Case Name: 2:18 cv-00276, 00278, 00279 TXEDC
Services Provided: Expert reports and Expert Testimony as needed (settled)
Date: Dec 2018 – Sep 2019

Expert Engagement:

Type of Matter: LED Display Panels
Client: Fabricant LLP on behalf of Plaintiff Ultravision (v. >10 companies)
Case Name: 2:18 cv-00112, 00118, 00150 TXEDC
Services Provided: Expert report and Expert Testimony as needed; two days deposition in 2020, two depositions in 2021. **Testified at trial May 2021**
Date: Jan 2019 – Present

Expert Engagement:

Type of Matter: TFT-LCD technology
Client: McDermott, Will and Emery on behalf of TCL (v. plaintiff Vista Park Ventures)
Case Name: 2:19 cv-00188, 00189, 00190, 00191 TXEDC
Services Provided: Expert reports and Expert Testimony as needed (settled)
Date: Aug 2019 – Oct 2019

Expert Engagement:

Type of Matter: TFT-LCD technology
Client: McDermott, Will and Emery on behalf of GiantPlus (v. plaintiff Vista Park Ventures)
Case Name: 2:19 cv-00183, 00184, 00185, 00187 TXEDC
Services Provided: Expert reports and Expert Testimony as needed (settled)
Date: Oct 2019 – Jan, 2020

Expert Engagement:

Thomas L. Credelle Curriculum Vitae

Type of Matter: TFT-LCD technology
Client: Vincent and Elkins on behalf of JDI (v. plaintiff Vista Park Ventures)
Case Name: 2:19 cv-00323, 00324, 00325 TXEDC
Services Provided: Expert reports and Expert Testimony as needed (settled)
Date: Nov 2019 – Jun 2020

Expert Engagement:

Type of Matter: TFT-LCD technology
Client: Sidley on behalf of LG Electronics (v. defendant Hisense)
Case Name: 2:19 cv-09474 CACDC
Services Provided: Expert reports and Expert Testimony as needed (settled)
Date: Feb. 2020 – Jan. 2021

Expert Engagement:

Type of Matter: Quantum dot technology
Client: Murtha Law on behalf of RPI (v. defendant Samsung)
Case Name: 2:19 cv-20097 KM-ESK
Services Provided: Expert reports and Expert Testimony as needed
Date: Jan. 2020 – Jun 2021

Expert Engagement:

Type of Matter: OLED, touch panels
Client: RAK Law on behalf of Solas (v. defendant Samsung)
Case Name: 2:19-cv-00152-JRG (E.D. Tex)
Services Provided: Expert reports and Expert Testimony; two depositions in 2020.
Testified at trial Mar. 2021.
Date: Apr. 2020 – Mar. 2021

Expert Engagement:

Type of Matter: LCD technology
Client: Morgan Lewis on behalf of Fuji Film (v. plaintiff Vista Park Ventures)
Case Name: 2:20 cv-00064, 65, 66 E.D. Tex.
Services Provided: Expert reports and Expert Testimony as needed (settled)
Date: Jul. 2020 – Oct 2020

Expert Engagement:

Type of Matter: Touch panels
Client: DLA Piper, Alston and Bird, on behalf of Microsoft, Dell (v. plaintiff Neodron)
Case Name: 2:19-cv-00318-ADA (W.D. Tex)
Services Provided: Expert Reports and Expert Testimony as needed (settled)
Date: Aug. 2020 – Nov. 2020

Thomas L. Credelle Curriculum Vitae

Expert Engagement:

Type of Matter: LCD
Client: Vincent and Elkins on behalf of Japan Display Inc (v. defendant Tianma)
Case Name: 2:20-CV-00283, 284, 285-JRG (E.D. Tex)
Services Provided: Expert Reports, depositions, and Expert Testimony as needed (settled)
Date: Jan 2021 – Jan 2022

Expert Engagement:

Type of Matter: LCD
Client: Perkins Coie on behalf of Truly Semiconductor, Hannstar (v. plaintiff Vista Park Ventures)
Case Name: 2:20-CV-250, 251, 252 (E.D. Tex)
Services Provided: Expert Reports and Expert Testimony as needed (settled)
Date: Jan 2021 – June 2021

Expert Engagement:

Type of Matter: Quantum dots
Client: Mintz on behalf of Nanoco (v. defendant Samsung)
Case Name: 2:20-CV-00038-JRG (E.D. Tex)
Services Provided: Expert Reports, depositions, case settled day before trial opening arguments
Date: Jan 2021 – Jan 2023

Expert Engagement:

Type of Matter: OLED circuits
Client: Morrison Forster on behalf of JOLED (v. defendant Samsung)
Case Name: Case No. 6:20cv559 (W.D. Tex.)
Services Provided: Expert Reports and Expert Testimony (settled)
Date: July 2020 – April 2021

Expert Engagement:

Type of Matter: OLED circuits
Client: Perkins Coie on behalf of AUO (v. defendant Samsung)
Case Name: TBD
Services Provided: Expert Reports and Testimony (settled)
Date: Feb. 2021 – May 2021

Expert Engagement:

Type of Matter: LED circuits
Client: Kim IP on behalf of CAST Lighting (v. Plaintiff WAC Lighting)
Case Name: ITC Inv. No. 337-TA-1261
Services Provided: Expert Reports and Testimony (settled)
Date: May 2021 – Oct 2021

Thomas L. Credelle Curriculum Vitae

Expert Engagement:

Type of Matter: OLED circuits
Client: RAKLaw on behalf of Solas, Ltd. (v. Defendant Samsung)
Case Name: ITC Inv. No. 337-TA-1243
Services Provided: Expert Reports and **Testified at Hearing Nov. 15-19, 2021**
Date: May 2021 – Dec 2021

Expert Engagement:

Type of Matter: OLED circuits
Client: PV Law on behalf of TCL (vs. Plaintiff SEL Co.)
Case Name: 8:21-cv-00554-JAK-ADS (CDCA)
Services Provided: Expert Reports and Depositions; case settled
Date: July 2021 – July 2023

Expert Engagement:

Type of Matter: LED circuits
Client: Carmichael IP on behalf of Lynk Labs (vs. defendant Samsung)
Case Name: IPR Proceedings
Services Provided: Expert Reports and Depositions
Date: Jan 2022 – Jan 2023

Expert Engagement:

Type of Matter: OLED circuits
Client: Baker Botts on behalf of FujiFilm (vs. defendant ButterflyQ)
Case Name: C.A. No. 22-309-JPM
Services Provided: Expert Reports and Depositions, testify at trial if needed (settled Nov, 2023)
Date: Jul 2022 – Nov. 2023

Expert Engagement:

Type of Matter: Outdoor signage
Client: Kilpatrick Townsend on behalf of MRI, Inc. (vs. defendants Samsung et al)
Case Name: ITC 337-TA-1331
Services Provided: Expert Reports, Depositions, **Testified at Hearing June 26-30, 2023**
Date: Oct 2022 - present

Expert Engagement:

Type of Matter: OLED circuits and pixel arrangements
Client: Orrick Herrington & Sutcliffe LLP on behalf of BOE (vs. plaintiff Samsung et al)
Case Name: ITC 337-TA-1351
Services Provided: Expert Reports, Depositions, testify at Hearing as needed
Date: Sep 2023 - present

Thomas L. Credelle Curriculum Vitae

Expert Engagement:

Type of Matter: Light concentrators, LCD backlights
Client: Katz PLLC on behalf of SVV (vs. defendants Asus and Acer)
Case Name: WD Tex 6:22-cv-0311, 312, 313, 511, 512, 513, 639, 640, 641-ADA
Services Provided: Expert Reports, Depositions, testify at trial if needed
Date: Jan 2023- present

Expert Engagement:

Type of Matter: LCD AMOLED circuits,
Client: Kramer Alberti on behalf of Polaris PowerLED Technologies, LLC (vs. defendant Samsung et al)
Case Name: EDEX 2:22-cv-00469-JRG
Services Provided: Expert Reports (IPR and DC), Depositions, testifying expert
Date: Mar 2023- present

Expert Engagement:

Type of Matter: LCD AMOLED circuits,
Client: Morrison & Forester LLP on behalf of Crystal Leap (vs. defendant HKC)
Case Name: No. 2:22-cv-00382 (EDEX)
Services Provided: Expert Reports (IPR and DC), Depositions, testifying expert
Date: Jul 2023- present

Expert Engagement:

Type of Matter: LCD AMOLED circuits,
Client: Kramer Alberti on behalf of Polaris PowerLED Technologies, LLC (vs. defendant Vizio et al)
Case Name: 2:23-cv-03478-GW-PD (CD CAL)
Services Provided: Expert Reports (IPR and DC), Depositions, testifying expert
Date: Dec 2023- present

Thomas L. Credelle Curriculum Vitae

Consulting Projects

Consulting Engagement:

Client: Tessera
Services Provided: Business case analysis for M&A department
Date: Mar 2008 to 2011

Consulting Engagement:

Client: Sipix Imaging
Services Provided: Technical consulting on display algorithms
Date: Mar 2008 to 2009

Consulting Engagement:

Client: Holox Technologies, Inc. (self-funded start up in holographic optics)
Services Provided: CEO; business leadership, fund raising, market analysis, optical design of advanced diffusers for LCD backlights, solar collectors, window films.
Date: Sept 2008 to June 2012

Consulting Engagement:

Client: Innova Dynamics, Inc.
Services Provided: Technical and business development consulting in touch screen technology
Date: October 2011 to November 2012

Technical and Patent Consulting:

Client: LG Display
Services Provided: Technical consulting on pixel processing algorithms, OLED displays; patent generation for advanced pixel concepts for OLED.
Date: Aug 2009 to Dec 2011

Consulting Engagement:

Client: Scivax
Services Provided: Technical and business development consulting in nanoimprinting technology
Date: Feb 2018 to Jul 2018

Thomas L. Credelle Curriculum Vitae

Professional Affiliations, Achievements & Awards

- Fellow of the Society for Information Display (SID)
- Past Director, SID Symposium Committee (10 years)
- Conference and Program Chair, SID Symposium and IDRC
- Past Member, SID Program Committee (15 years)

US Patents & Publications

<u>Patent</u>	<u>Date</u>	<u>Description</u>
10,163,985	12/25/2018	Subpixel arrangement structure for a display device
9,583,034	02/28/2017	Subpixel arrangement structure for a display device
9,041,625	05/26/2015	Subpixel arrangement structure for a display device and display device
9,001,167	04/07/2015	Display panel having crossover connections effecting dot inversion
8,933,959	01/13/2015	Subpixel layouts and subpixel rendering methods for directional displays and systems
8,876,937	11/04/2014	Production of nanostructures
8,797,344	08/05/2015	Memory structures for image processing
8,754,913	06/17/2014	Subpixel arrangement structure of display device
8,704,744	04/22/2014	Systems and methods for temporal subpixel rendering of image data
8,633,886	01/21/2014	Display panel having crossover connections effecting dot inversion
8,519,910	08/27/2013	Image processing method and display device using the same
8,516,683	08/27/2013	Methods of making a radio frequency identification (RFID) tags
8,456,496	06/04/2013	Color flat panel display sub-pixel arrangements and layouts for sub-pixel rendering with split blue sub-pixels
8,456,414	06/04/2013	Gamma adjustment with error diffusion for electrophoretic displays
8,436,799	05/07/2013	Image degradation correction in novel liquid crystal displays with split blue subpixels
8,421,820	04/16/2013	Methods and systems for sub-pixel rendering with adaptive filtering
8,411,022	04/02/2013	Multiprimary color display with dynamic gamut mapping
8,405,692	03/26/2013	Color flat panel display arrangements and layouts with reduced blue luminance well visibility
8,378,947	02/19/2013	Systems and methods for temporal subpixel rendering of image data
8,294,741	10/23/2012	Four color arrangements of emitters for subpixel rendering
8,259,127	09/04/2012	Systems and methods for reducing desaturation of images rendered on high brightness displays
8,144,094	03/27/2012	Liquid crystal display backplane layouts and addressing for non-standard subpixel arrangements

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8,134,583	03/13/2012	Two color flat panel display sub-pixel arrangements and layouts for sub-pixel rendering with split blue sub-pixels
8,035,599	10/11/2011	Display panel having crossover connections effecting dot inversion
8,018,476	09/13/2011	Subpixel layouts for high brightness displays and systems
8,013,867	09/06/2011	Systems and methods for implementing improved gamut mapping algorithms
7,969,456	06/28/2011	Methods and systems for sub-pixel rendering with adaptive filtering
7,876,341	06/25/2011	Subpixel layouts for high brightness displays and systems
7,864,194	01/04/2011	Systems and methods for motion adaptive filtering
7,791,679	09/07/2010	Alternative thin film transistors for liquid crystal displays
7,755,652	07/13/2010	Color flat panel display sub-pixel rendering and driver configuration for sub-pixel arrangements with split sub-pixels
7,701,476	04/20/2010	Four color arrangements of emitters for subpixel rendering
7,646,430	01/12/2010	Display system having improved multiple modes for displaying image data from multiple input source formats
7,592,996	09/22/2009	Multiprimary color display with dynamic gamut mapping
7,583,279	09/01/2009	Subpixel layouts and arrangements for high brightness displays
7,573,493	08/11/2009	Four color arrangements of emitters for subpixel rendering
7,573,448	08/11/2009	Dot inversion on novel display panel layouts with extra drivers
7,559,131	07/14/2009	Method of making a radio frequency identification (RFID) tag
7,505,053	03/17/2009	Subpixel layouts and arrangements for high brightness displays
7,492,379	02/17/2009	Color flat panel display sub-pixel arrangements and layouts for sub-pixel rendering with increased modulation transfer function response
7,417,648	08/26/2008	Color flat panel display sub-pixel arrangements and layouts for sub-pixel rendering with split blue sub-pixels
7,397,455	07/08/2008	Liquid crystal display backplane layouts and addressing for non-standard subpixel arrangements
7,283,142	10/16/2007	Color display having horizontal sub-pixel arrangements and layouts
7,260,882	08/28/2007	Methods for making electronic devices with small functional elements supported on a carriers
7,248,271	07/24/2007	Sub-pixel rendering system and method for improved display viewing angles
7,218,301	05/15/2007	System and method of performing dot inversion with standard drivers and backplane on novel display panel layouts
7,187,353	03/06/2007	Dot inversion on novel display panel layouts with extra drivers
7,184,066	02/27/2007	Methods and systems for sub-pixel rendering with adaptive filtering
7,167,186	01/23/2007	Systems and methods for motion adaptive filtering
7,084,923	08/01/2006	Display system having improved multiple modes for displaying image data from multiple input source formats
7,068,287	06/27/2006	Systems and methods of subpixel rendering implemented on display panels
7,046,256	05/16/2006	System and methods of subpixel rendering implemented on display panels
6,985,361	01/10/2006	Electronic devices with small functional elements supported on a carrier
6,917,368	07/12/2005	Sub-pixel rendering system and method for improved display viewing angles

Thomas L. Credelle

Curriculum Vitae

6,816,380	11/09/2004	Electronic devices with small functional elements supported on a carrier
6,731,353	05/04/2004	Method and apparatus for transferring blocks
6,693,384	02/17/2004	Interconnect structure for electronic devices
6,606,247	08/12/2003	Multi-feature-size electronic structures
5,961,362	10/05/1999	Method for in situ cleaning of electron emitters in a field emission device
5,883,467	03/16/1999	Field emission device having means for in situ feeding of hydrogen
5,477,350	12/19/1995	Interferometric spatial switch for polarized or unpolarized light using liquid crystal
5,373,393	12/13/1994	Optical interferometric device with spatial light modulators for switching substantially coherent light
5,363,228	11/08/1994	Optical device with spatial light modulators for switching arbitrarily polarized light
5,345,321	09/06/1994	Compact polarization dependent optical switching units
5,319,477	06/07/1994	Compact polarization independent optical switching units
5,317,445	05/31/1994	Optical device with spatial light modulators for switching polarized light
4,630,893	12/23/1986	LCD pixel incorporating segmented back-to-back diode
4,598,227	07/01/1986	Electron beam convergence and scanning structures for flat panel display device
4,517,489	05/14/1985	Modulator structure and method for flat panel display devices
4,484,103	11/20/1984	Color selection electron beam guide assembly for flat panel display devices
4,362,966	12/07/1982	Electron leakage reduction in flat panel display devices
4,335,332	06/15/1982	Focus mesh structure and biasing technique for flat panel display devices
4,316,118	02/16/1982	Guided beam display device
4,298,819	11/03/1981	Beam Clean up structure for flat panel display devices
4,234,815	11/18/1980	Flat display tube having shielding member between beam guide and screen
4,174,881	11/20/1979	Recording a synthetic focused-image hologram on a thermally deformable plastic
4,153,856	05/08/1979	Proximity focused element scale image display device
4,148,636	04/10/1979	Broadening the spatial frequency pass band of a thermoplastic layer
4,137,478	01/30/1979	Color flat panel television
4,137,077	01/30/1979	Broadening the spatial frequency pass band of a thermoplastic layer
4,131,823	12/26/1978	Modular flat display device with beam convergence
4,121,137	10/17/1978	System for achieving image uniformity in display devices
4,103,205	07/25/1978	Flat display device with beam guide
4,103,204	07/25/1978	Flat display device with beam guide
4,088,920	05/09/1978	Flat display device with beam guide

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Publications

1. “Thermoplastic Media for Holographic Recording,” RCA Review: A Technical Journal (1972)
2. “Guided Beam Displays for Large Screen Flat-Panel Color TV,” Information Display (1983)
3. “Recent trends in color avionic LCDs,” Information Display (1987)
4. “Thin-film transistors for video applications,” Inter. Display Research Conference Record (1988)
5. “TFT-LCD for video applications,” Information Display (1989)
6. “LCDs,” JTEC Panel Report on Display Technologies in Japan (1992)
7. “Viewing-Angle-Enhancement System for LCDs” SID Digest of Technical Papers (1995)
8. “SpectraVue™: A new system to enhance the viewing angle of LCDs,” SID Journal (1997)
9. “The Business Case for Motorola's Flat-Panel-Display Division,” Information Display (1997)
10. “MTF of high-resolution PenTile Matrix™ displays,” Proc Eurodisplay (2002)
11. “Adding a White Subpixel,” Information Display (2005)
12. “Low Power, High-Pixel-Density Mobile Displays Using PenTile RGBW™ Architectures,” SID Mobile Displays Digest of Technical Papers (2006)
13. “*Invited Paper*: High-Pixel-Density Mobile Displays: Challenges and Solutions,” SID Digest of Technical Papers (2006)