

Zane Coleman

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LED LIGHTING & OPTICAL TECHNOLOGY EXPERT

PROFILE

- Expertise in LED Lighting, backlights, displays, lightguides, and optical technology
- Inventor on 107 issued patents
- Expertise and analytical skills for optical and physical product analysis
- USPTO Registered Patent Agent

EMPLOYMENT

- Phostech* **President** 2009 – Present
- Optical consulting and patent prosecution services
 - Expert reports, depositions, and court testimony on validity and infringement for defendant, SVV Tech. Innov. Inc. v ACER INC.
 - Expert reports (5) on infringement and validity rebuttal for plaintiff, depositions (3), Ultravision v. Holophane Europe LTD, Yaham Optoelectronics, Samsung Electronics Co. Ltd. relating to area lighting fixtures
 - Expert declarations (3) and deposition for Petitioners Technical Consumer Products, Inc., Nicor Inc., Amax Lighting, Inc. in IPR petitions for LSG Corp. LED light fixture patents
 - Expert declarations related to LED light fixtures in Ultravision Technologies, LLC v. Lamar Advertising Co.
 - Submitted declarations for 12 USPTO *Inter partes* reviews related to backlights and light fixtures
 - Expert declaration, deposition, Morgan Solar, Inc. v. Banyan Energy Inc., USPTO PTAB Interfer. No. 105,972
 - Invented backlights, flexible lightguide technology, waveguides, LED bulbs based on waveguides, LED light fixture configurations, concentrating solar collection systems, other illumination devices
- Fusion Optix Inc.* **VP Technology & Dir. of Technology** 2006-2009
- Led the research strategy and transfer of technology to products in the display and LED lighting industries
- Developed technology roadmaps, intellectual property strategy, & competitive benchmarking
 - Invented more than 35 unique, patentable products and drafted & prosecuted 60+ patent applications
 - Managed and researched optical films, display backlights, LED light fixture, and LED light bulb projects
 - Co-developed the optical system of a Lightfair 2009 Innovation Award-winning LED light fixture
- Manager, Optical Engineering** 2005-2006
- Developed and prototyped micro-replicated, multi-functional optical films for displays and light fixtures through optical modeling, prototyping, optical and thermal analysis, and specification
 - Designed and managed optical film, LED backlight, and light fixture optical and thermal characterization lab
 - Led polymer based optical film research including production and optical characterization
- Phostech* **President** 2003-2005
- Optical design & analysis of diffusing films, refractive-TIR films, displays, LCD backlights, lightguides, illuminated signs and light fixtures
 - Invented new optical films, light fixtures, projection screens, backlights and displays
- Motorola Labs* **Senior Physicist** 1997-2002
- Optically designed & constructed world's first personal micro-projector (US Patent 6,637,896)
 - Designed reflection and transmission micro-structured optical films for display backlights and illumination
 - Designed and developed 3 new optical film products with suppliers, including an optical film with 3M which was shipped in over 100 million cellular phones
 - Analyzed thermal and optical properties of products including developing new measurement techniques
- ImEdge Technology Inc.* **Optical Engineer** 1993-1997
- Co-invented new methods for recording edge-lit lightguide based holograms and edge-lit devices for display illumination and biometric applications (7 issued patents)
 - Modeled, recorded, and performed optical and thermal analysis of optical components and systems

EDUCATION

Ph.D. in Physics, Loughborough University (UK) 1997

Applied rigorous coupled wave diffraction theory to model and analyze recorded edge-lit holograms

BSc. in Applied Physics, Certificate in Optics, Georgia Institute of Technology 1992

Issued Patents

- 1) **12,366,698** Light emitting device including a light absorbing cladding region on edges of a core layer of a film-based lightguide
- 2) **12,262,154** Reflective display comprising coupling lightguides folded at different fold angles
- 3) **12,228,762** A light emitting display with a film-based lightguide frontlight, a reflective spatial light modulator, and a housing positioned in an edge region
- 4) **12,185,442** Method of illuminating an environment using an angularly varying light emitting devices and a target illuminance for a spatial zone
- 5) **12,135,450** Method of manufacturing a display using a film-based lightguide and diffusely reflective release liner
- 6) **CN113678035** Reflective display comprising a lightguide and light turning film creating multiple illumination peaks
- 7) **12,117,639** Film-based lightguide with interior light directing edges with curved sections in a tapered light mixing region
- 8) **11,994,698** Film-based frontlight with angularly varying diffusion film
- 9) **11,966,116** Reflective display comprising a lightguide and light turning film creating multiple illumination peaks
- 10) **11,947,149** Reflective display with film-based lightguide frontlight including light turning film with coated surfaces
- 11) **CN113678036** Reflective display including coupling lightguides folded at different fold angles
- 12) **CN113678034** Front illumination lightguide with a diffusely reflective release liner
- 13) **11,889,603** System for illuminating an environment with reduced shadows using two angularly varying light emitting devices
- 14) **11,828,966** Transmissive display Including a backlight with multiple stacked lightguides with a fold
- 15) **11,703,626** Light emitting device with film-based lightguide and added reflecting surfaces
- 16) **11,681,305** Fluid transfer component for transferring thermal energy comprising a film with fluid channels
- 17) **CN113272693** Film-based frontlight with angularly varying diffusion film
- 18) **11,640,026** Automobile with conformal film-based lightguide
- 19) **11,576,243** Angularly varying light emitting device with a light sensor
- 20) **CN111542772** Light emitting device with film-based lightguide and added reflecting surfaces
- 21) **11,513,274** Lightguide with a light input edge between lateral edges of a folded strip
- 22) **EP2683980** Light emitting device with adjustable light output profile
- 23) **BR112012026327** Front illumination device comprising a film-based light guide
- 24) **EP2558776** Front illumination device comprising a film-based lightguide
- 25) **11,442,213** Film-based lightguide with extended coupling lightguide region
- 26) **11,275,204** Reflective display including a frontlight with multiple stacked lightguides with a fold
- 27) **IN369030** Sign comprising a film based lightguide
- 28) **11,256,025** Film-based lightguide with adhered component between fold region and extraction region
- 29) **11,184,967** Angularly varying light emitting device with an imager
- 30) **11,092,977** Fluid transfer component comprising a film with fluid channels
- 31) **11,009,646** Film-based lightguide with interior light directing edges in a light mixing region
- 32) **10,935,716** Film-based lightguide with bend positioning strips behind an extraction region
- 33) **10,816,939** Method of illuminating an environment using an angularly varying light emitting device and an imager
- 34) **10,802,196** Reflective display including a lightguide, light redirecting optical element, and cladding layer
- 35) **KR102165542** Front illumination device comprising a film-based lightguide

- 36) **CA2796515** Front illumination device comprising a film-based lightguide
- 37) **10,598,848** Light emitting device comprising a lightguide with a glass core layer
- 38) **EP2558775** Illumination Device Comprising A Film-Based Lightguide
- 39) **10,466,409** Light emitting device comprising a film-based lightguide restrained by a component conducting heat from a light source
- 40) **10,429,577** Light emitting device with a high luminous flux density in a film-based lightguide
- 41) **10,401,876** Fluid collection component comprising a film with fluid channels
- 42) **10,393,941** Display with reflective spatial light modulator and a film-based lightguide folded behind the modulator to receive light from a light source positioned on an electrical display connector
- 43) **10,307,871** Device with dynamic optical states using fluids with different optical properties
- 44) **10,254,472** Film-based light fixture for illumination beneath a ceiling tile
- 45) **10,215,905** Film-based lightguide having a stacked array of coupling portions wrapped by a portion of a light mixing region
- 46) **10,191,199** Display including a film lightguide bent around a guide element
- 47) **KR101939719** Front illumination device comprising a film-based lightguide
- 48) **10,175,413** Light emitting device comprising a film-based lightguide and reduced cladding layer at the input surface
- 49) **10,073,208** Light emitting device including film lightguide with a light mixing region and light emitting region
- 50) **10,036,847** Film-based light fixture with light reflecting layer and fastener
- 51) **CA2829388** Light emitting device with adjustable light output profile
- 52) **KR101821727** Front illumination device comprising a film-based lightguide
- 53) **9,804,607** Fluid transfer systems, devices, components, and methods of manufacture
- 54) **9,798,075** Film-based light fixture with see-through light emitting region
- 55) **9,690,032** Lightguide including a film with one or more bends
- 56) **JP6132762** Front illumination device comprising a film-based lightguide
- 57) **9,651,729** Reflective display comprising a frontlight with extraction features and a light redirecting optical element
- 58) **9,645,304** Directional front illuminating device comprising a film based lightguide with high optical clarity in the light emitting region
- 59) **9,566,751** Methods of forming film-based lightguides
- 60) **9,557,473** Reflective spatial light modulator display with stacked lightguides and method
- 61) **9,523,807** Device comprising a film-based lightguide and component with angled teeth
- 62) **9,110,200** Illumination device comprising a film-based lightguide
- 63) **9,103,956** Light emitting device with optical redundancy
- 64) **9,028,123** Display illumination device with a film-based lightguide having stacked incident surfaces
- 65) **8,958,698** Versatile remote control device and system
- 66) **8,950,902** Light emitting device with light mixing within a film
- 67) **8,917,962** Method of manufacturing a light input coupler and lightguide
- 68) **8,905,610** Light emitting device comprising a lightguide film
- 69) **CA2702600** Light emitting devices and applications thereof
- 70) **CA2702690** Light emitting devices and applications thereof
- 71) **CA2702685** Light emitting devices and applications thereof
- 72) **8,794,812** Light emitting devices and applications thereof
- 73) **8,783,898** Light emitting devices and applications thereof
- 74) **8,761,565** Arcuate lightguide and light emitting device comprising the same

- 75) **8,721,152** Light emitting devices and applications thereof
- 76) **8,619,363** Light redirecting element comprising a forward diffracting region and a scattering region
- 77) **8,434,909** Light emitting display with light mixing within a film
- 78) **8,430,548** Enhanced light fixture with volumetric scattering
- 79) **8,408,775** Light recycling directional control element and light emitting device using the same
- 80) **8,249,408** Method of manufacturing an optical composite
- 81) **8,233,803** Versatile remote control device and system
- 82) **8,231,256** Light fixture comprising a multi-functional non-imaging optical component
- 83) **8,177,408** Light filtering directional control element and light fixture incorporating the same
- 84) **8,033,706** Lightguide comprising a low refractive index region
- 85) **8,033,674** Optical components and light emitting devices comprising asymmetric scattering domains
- 86) **7,991,257** Method of manufacturing an optical composite
- 87) **7,914,192** Enhanced light diffusing sheet
- 88) **7,784,954** Polarization sensitive light homogenizer
- 89) **7,758,227** Light fixture with curved light scattering region comprising ellipsoidal domains
- 90) **7,722,224** Illuminating device incorporating a high clarity scattering layer
- 91) **7,542,635** Dual illumination anisotropic light emitting device
- 92) **7,453,636** High contrast optical path corrected screen
- 93) **7,453,635** Imaging material with improved contrast
- 94) **7,431,489** Enhanced light fixture
- 95) **7,408,707** Multi-region light scattering element
- 96) **7,278,775** Enhanced LCD backlight
- 97) **7,015,893** Photoluminescent electrophoretic display
- 98) **6,861,788** Switchable display/mirror method and apparatus
- 99) **6,637,896** Compact projection system and associated device
- 100) **6,636,285** Reflective liquid crystal display with improved contrast
- 101) **6,151,142** Grazing incidence holograms and system and method for producing the same
- 102) **6,061,463** Holographic fingerprint device
- 103) **5,986,746** Topographical object detection system
- 104) **5,974,162** Device for forming and detecting fingerprint images with valley and ridge structure
- 105) **5,822,089** Grazing incidence holograms and system and method for producing the same
- 106) **5,710,645** Grazing incidence holograms and system and method for producing the same
- 107) **EP0749610** Compact device for producing an image of the topological surface

US Patent Application Publications

- 1) **20250294658** Wearable light emitting device having a controllable light output in different angular bins
- 2) **20250275039** Light emitting system selectively increasing light toward an individual
- 3) **20250275038** Angularly varying light emitting device increasing contrast
- 4) **20250275037** Angularly varying light emitting device emitting light with wavelengths greater than 700 nanometers
- 5) **20250275036** Angularly varying light emitting device excluding television illumination
- 6) **20250275035** Light emitting device prioritizing illumination or irradiation modes
- 7) **20250275034** Method for controlling light sources of a lighting system
- 8) **20250267780** Light emitting device with individually addressable light sources emitting light into different angular bins
- 9) **20250275033** Angularly varying light emitting device with individually addressable light sources and an optical element
- 10) **20250275032** Light emitting device with an array of individually addressable visible light sources, ultraviolet light sources, and an imager
- 11) **20250267779** Portable device with angularly varying light output, imager, and reduced glare
- 12) **20250267778** Illumination system with angularly varying light emitting device, imager, and time of flight sensor
- 13) **20250267777** Method of illumination from light sources with different spectral light output using an imager
- 14) **20250267776** Light emitting device with an image sensor and spectrally different light sources
- 15) **20250267775** Light emitting device with spectrally different light sources emitting light synchronized to a sensor
- 16) **20250275031** A light emitting device emitting light into different angular bins and illuminating a pathway and a form of an image, video, indicia, or graphic
- 17) **20250247507** Guide element with a plurality of angled edges oriented at different angles
- 18) **20250172734** Light emitting device incl a light absorbing cladding region on edges of a core layer of a film-based lightguide
- 19) **20250155741** Display with a privacy viewing mode including a film-based lightguide backlight between a first backlight and a transmissive display
- 20) **20250126693** Light emitting system comprising an imager and plurality of light sources illuminating an environment from different angular ranges
- 21) **20250067921** Film-based lightguide with interior light directing edges and lateral reflections
- 22) **20240369755** Film-based lightguide with stacked strips and light source emitting light into non-lateral edge surfaces of the strips
- 23) **20240302580** Dual backlight display with privacy mode
- 24) **20240248248** Light emitting display with a film-based lightguide frontlight, a reflective spatial light modulator, and a housing positioned in an edge region
- 25) **20240172349** Method of illuminating an environment using an angularly varying light emitting devices and a target illuminance for a spatial zone
- 26) **20230350122** Film-based lightguide with interior light directing edges with curved sections in a tapered light mixing region
- 27) **20230389161** System for illuminating an environment with reduced shadows using two angularly varying light emitting devices
- 28) **20230099260** Reflective display with film-based lightguide frontlight including light turning film with coated surfaces

- 29) **20230011530** Light emitting device with film-based lightguide and added reflecting surfaces
- 30) **20220268984** Lightguide with a light input edge between lateral edges of a folded strip
- 31) **20220196903** Light emitting device including multiple stacked lightguides with a fold
- 32) **20220179148** Automobile with conformal film-based lightguide
- 33) **20220086988** Angularly varying light emitting device with a light sensor
- 34) **20210373582** Fluid transfer component for transferring thermal energy comprising a film with fluid channels
- 35) **20210112647** Angularly varying light emitting device with an imager
- 36) **20210080638** Reflective display including frontlight with multiple folded lightguides
- 37) **20210337173** Reflective display comprising coupling lightguides folded at different fold angles
- 38) **20210333629** Reflective display comprising a lightguide and light turning film creating multiple illumination peaks
- 39) **20210294021** Method of manufacturing a display using a film-based lightguide and diffusely reflective release liner
- 40) **20210278585** Film-based lightguide with extended coupling lightguide region
- 41) **20210215857** Film-based frontlight with angularly varying diffusion film
- 42) **20210112647** Angularly varying light emitting device with an imager
- 43) **20210080638** Reflective display including a frontlight with multiple folded lightguides
- 44) **20200064540** Film-based lightguide with bend positioning strips behind an extraction region
- 45) **20200033532** Light emitting device comprising a lightguide with a glass core layer
- 46) **20190235157** Light emitting device with a high luminous flux density in a film-based lightguide
- 47) **20190187360** Reflective display including a lightguide, light redirecting optical element, and cladding layer
- 48) **20190170928** Light emitting device comprising a film-based lightguide restrained by a component conducting heat from a light source
- 49) **20190170925** Film-based lightguide with interior light directing edges in a light mixing region
- 50) **20180348425** Film-based light fixture for illumination beneath a ceiling tile
- 51) **20180210131** Light emitting device including a film lightguide with a light mixing region and light emitting region
- 52) **20180210131** Light emitting device including a film lightguide with a light mixing region and light emitting region
- 53) **20180059690** Device with dynamic optical states using fluids with different optical properties
- 54) **20180059318** Film-based light fixture with light reflecting layer and fastener
- 55) **20180052274** Display with reflective spatial light modulator and a film-based lightguide frontlight folded behind the modulator to receive light from a light source positioned on an electrical display connector
- 56) **20170285243** Display including a guide element and film lightguide bent around the guide and behind the display
- 57) **20170235036** Light emitting device with a film-based lightguide comprising a light mixing region wrapped completely around coupling lightguides
- 58) **20170205572** Film-based light fixture with see-through light emitting region
- 59) **20170045669** Light emitting device comprising a film-based lightguide and reduced cladding layer at the input surface
- 60) **20150253487** Reflective display comprising a frontlight with extraction features and a light redirecting optical element
- 61) **20150219834** Display with a film-based lightguide and light redirecting optical element
- 62) **20150078035** Device comprising a film-based lightguide and component with angled teeth
- 63) **20140360578** Solar energy system including a lightguide film
- 64) **20140063853** Film-based lightguide including a wrapped stack of input couplers and light emitting device including the same
- 65) **20140056028** Light emitting device with adjustable light output profile

- 66) **20140049983** Light emitting device comprising a lightguide film and aligned coupling lightguides
- 67) **20130314942** Packaging comprising a lightguide
- 68) **20130250618** Light emitting device with light mixing within a film
- 69) **20130208508** Light emitting device with optical redundancy
- 70) **20130155723** Replaceable lightguide film display
- 71) **20120294620** Versatile remote control device and system
- 72) **20120288283** Versatile remote control device and system
- 73) **20120287674** Illumination device comprising oriented coupling lightguides
- 74) **20120082461** Versatile remote control device and system
- 75) **20110286222** Method of manufacturing an optical composite
- 76) **20110277361** Sign comprising a film-based lightguide
- 77) **20110273906** Front illumination device comprising a film-based lightguide
- 78) **20110255303** Illumination device comprising a film-based lightguide
- 79) **20110227487** Light emitting display with light mixing within a film
- 80) **20110013420** Light emitting devices and applications thereof
- 81) **20100321953** Light emitting devices and applications thereof
- 82) **20100321952** Light emitting devices and applications thereof
- 83) **20080094854** Dual illumination anisotropic light emitting device
- 84) **20080043490** Enhanced Light Guide
- 85) **20070201246** Enhanced Light Diffusing Sheet
- 86) **20060290253** Enhanced Diffusing Plates, Films and Backlights
- 87) **20060227546** Enhanced light fixture
- 88) **20060215958** Enhanced electroluminescent sign
- 89) **20060066945** High contrast optical path corrected screen
- 90) **20060056166** Enhanced LCD backlight
- 91) **20060056022** Imaging material with improved contrast
- 92) **20060056021** Multi-region light scattering element
- 93) **20050259302** Holographic light panels and flat panel display systems and method and apparatus for making same
- 94) **20040245902** Switchable display/mirror method and apparatus
- 95) **20040151491** Apparatus and method concerning a passive multi-indicia visual position indicator
- 96) **20040150613** Photoluminescent electrophoretic display
- 97) **20030081184** Compact projection system and associated device
- 98) **20030081154** Reflective liquid crystal display with improved contrast
- 99) **20030020975** Holographic light panels and flat panel display systems and method and apparatus for making same
- 100) **20020001110** Holographic light panels and flat panel display systems and method and apparatus for making same

International Patent Application Publications

- 1) **CN117891020** Reflective display comprising coupling lightguides folded at different fold angles
- 2) **WO2022072386** Manufacturing a lightguide with cut lateral edges
- 3) **EP3908866** Reflective display comprising coupling lightguides folded at different fold angles
- 4) **EP3894917** Front illumination device with a diffusely reflective release liner
- 5) **WO2021022307** Lightguide with a light input edge between lateral edges of a folded strip
- 6) **CN113678036** Reflective display including coupled light guides folded at different folding angles
- 7) **CN113678035** Reflective Display Comprising a Lightguide and Light Turning Film Creating Multiple Illumination Peaks
- 8) **CN113678034** Front Lighting Light Guide with Diffuse Release Liner
- 9) **CN113272693** Film-Based Frontlight with Angularly Varying Diffusion Film
- 10) **CN111542772** Light emitting device with film-based lightguide and added reflecting surfaces
- 11) **WO2021022307** Lightguide with a light input edge between lateral edges of a folded strip
- 12) **WO2020146668** Reflective display comprising coupling lightguides folded at different fold angles
- 13) **WO2020142731** Reflective display comprising a lightguide and light turning film creating multiple illumination peaks
- 14) **WO2020123539** Front illumination lightguide with a diffusely reflective release liner
- 15) **WO2020047340** Film-based frontlight with angularly varying diffusion film
- 16) **BR112012026329** Sign comprising a film-based lightguide
- 17) **BR112012026325** Illumination device comprising a film-based lightguide
- 18) **BR112012026327** Front illumination device comprising a film-based lightguide
- 19) **WO2019090139** Light emitting device with film-based lightguide and added reflecting surfaces
- 20) **KR20190007102** Front illumination device comprising a film-based lightguide
- 21) **KR20180008882** Front illumination device comprising a film-based lightguide
- 22) **JP2013525955** Illumination device comprising a film-based lightguide
- 23) **JP2013525836** Sign comprising a film-based lightguide
- 24) **JP2013530412** Front illumination device comprising a film-based lightguide
- 25) **AU2012225244** Light emitting device with adjustable light output profile
- 26) **CA2829388** Light emitting device with adjustable light output profile
- 27) **EP2683980** Light emitting device with adjustable light output profile
- 28) **KR20130096155** Illumination device comprising a film-based lightguide
- 29) **MX2012012033** Illumination device comprising a film-based lightguide
- 30) **MX2012012035** Sign comprising a film-based lightguide
- 31) **MX2012012034** Front illumination device comprising a film-based lightguide
- 32) **CN103038568** Front illumination device comprising a film-based lightguide
- 33) **CN103038567** Illumination device comprising a film-based lightguide
- 34) **WO2012158460** Solar energy system including a lightguide film
- 35) **KR20130096155** Illumination device comprising a film-based lightguide
- 36) **KR20130055598** Front illumination device comprising a film-based lightguide
- 37) **KR20130054263** Sign comprising a film-based lightguide
- 38) **EP2558775** Illumination device comprising a film-based lightguide
- 39) **EP2558893** Sign comprising a film-based lightguide
- 40) **EP2558776** Front illumination device comprising a film-based lightguide
- 41) **CN102918435** Sign comprising a film-based lightguide
- 42) **GB2492398** Manufacturing an optical composite using inverted light collimating surface features
- 43) **WO2012122511** Light emitting device with adjustable light output profile
- 44) **WO2012088315** Packaging comprising a lightguide
- 45) **WO2012068543** Light emitting device comprising a lightguide film and aligned coupling lightguides
- 46) **WO2012044972** Versatile remote control device, system, and method

- 47) **WO2012016047** Light emitting device with optical redundancy
- 48) **CA2796515** Sign comprising a film-based lightguide
- 49) **CA2796518** Illumination device comprising a film-based lightguide
- 50) **CA2796519** Illumination device comprising a film-based lightguide
- 51) **WO2011130715** Illumination device comprising a film-based lightguide
- 52) **WO2011130718** Front illumination device comprising a film-based lightguide
- 53) **WO2011130720** Sign comprising a film-based lightguide
- 54) **CA2702600** Light emitting devices and applications thereof
- 55) **CA2702685** Light emitting devices and applications thereof
- 56) **CA2702690** Light emitting devices and applications thereof
- 57) **WO2007002317** Enhanced diffusing plates, films and backlights
- 58) **WO2006055872** Enhanced light fixture
- 59) **WO2006055873** Enhanced electroluminescent sign
- 60) **WO2006032002** High contrast optical path corrected screen
- 61) **WO2006026743** Enhanced light diffusing sheet
- 62) **WO2006031545** Enhanced LCD backlight
- 63) **WO2006020583** Imaging material with improved contrast
- 64) **WO2006017585** Multi-region light scattering element
- 65) **CN1573448** Switchable display/mirror method and apparatus
- 66) **KR20040104427** Switchable display/mirror method and apparatus including switchable mirror with display operation mode and mirror operation mode
- 67) **WO2003038509** Reflective liquid crystal display with improved contrast
- 68) **WO2003038517** Compact projection system and associated device
- 69) **AT195189** Device for forming and detecting fingerprint images with valley and ridge structure
- 70) **JPH09509490** Device for forming and detecting fingerprint images with valley and ridge structure
- 71) **AU1925595** Method of producing and detecting high-contrast images of the surface topography of objects and a compact system for carrying out the same
- 72) **CA2183567** Method of producing and detecting high-contrast images of the surface topography of objects and a compact system for carrying out the same
- 73) **WO199522804** Method of producing and detecting high-contrast images of the surface topography of objects and a compact system for carrying out the same

Publications and Presentations

- 1) "LED Technology," LED Lighting Panel Discussion at Heartland Angel's "LEDs: What are they and why are they important" Chicago, IL, (2010)
- 2) "Challenges and opportunities for light management optics in LED lighting systems," LEDs 2008 Conference, San Diego, CA, (2008)
- 3) "Optically efficient displays and solid-state lighting systems using anisotropic polymer films," SID, New England Chapter, Dec. (2006)
- 4) "Novel high brightness LED backlight design and optimization," Mark Chu, Zane Coleman, Kurt Henrickson, Terry Yeo, Americas Display Engineering and Applications Conference, Atlanta, GA (2006)
- 5) "Head-mounted displays for visual communication," Zane Coleman, George Valliath, Motorola Hermes, internal conference (2000)
- 6) "LCD glare avoidance using a surface relief diffractive optical element," Zane Coleman, George Valliath, Motorola Publication via www.IP.com
- 7) "Display optical enhancement films," Zane Coleman, George Valliath, Robert Akins, Kevin Jelley" Motorola Hermes, internal conference (1999)
- 8) "Design of hologram for brightness enhancement in color LCDs," G.T. Valliath, Z.A. Coleman, J.L. Schindler, R. Polak, R.B. Akins, K.W. Jelley, Society for Information Display '98, Conference Proceedings Vol. 29, p. 1139, Anaheim, CA (1998)
- 9) "Modern holographic recording and analysis techniques applied to edge-lit holograms and their applications," Ph.D. in Physics Thesis, Loughborough University, Loughborough, England (1997)
- 10) "Holographic optical element for compact fingerprint imaging system", M.H. Metz, N. J. Phillips, Z. A. Coleman, C. Flatow, Optical Security and Counterfeit Deterrence Techniques, SPIE Proceedings vol. 2660, San Jose, CA (1996)
- 11) "Holograms in the extreme edge illumination geometry", Zane A. Coleman, Michael H. Metz, Nicholas J. Phillips, Holographic Materials II, SPIE Proceedings vol. 2688, San Jose, CA (1996)
- 12) "The use of edge-lit holograms for compact fingerprint capture", M. Metz, C. Flatow, Z. Coleman, N.J. Phillips, CardTec SecureTec, April 10th, (1995)
- 13) "Links between holography and lithography," Phillips, Nicholas J.; Barnett, Christopher A.; Wang, Ce; Coleman, Zane A., Proc. SPIE Vol. 2333, p. 206-214, Fifth International Symposium on Display Holography, Tung H. Jeong; Ed. (1995)
- 14) "Dichromated gelatin--some heretical comments", N.J. Phillips, R. D. Rallison, C. A. Barnett, S. R. Schicker, Z. A. Coleman, Practical Holography VII: Imaging Materials, SPIE vol. 1914, pp 101-114 (1993)
- 15) "Novel methods for the creation of silver-free images in holography, using conventional silver halide emulsion", N.J. Phillips, Z.A. Coleman, C. Wang, Holographic Systems, Components, and Applications, IEE Conf. Publication No 379, Neuchatel, Switzerland (1993)
- 16) "Holograms in the edge-illuminated geometry-new materials developments", N.J. Phillips, C. Wang, Z. Coleman, Practical Holography VII: Imaging Materials, SPIE vol. 1914, pp 75-81 (1993)

Legal Consulting

Type of Matter:	Expert in Lighting for Petitioner
Client:	Astera Manufacturing Ltd., Chauvet & Sons, LLC
Case Name:	IPR2025-01022 Astera Manufacturing Ltd., Chauvet & Sons, LLC v ElectraLED Inc.; 2:24-cv-00511; 2:24-cv-00512; Re-exam 90/015,905
Services:	One declaration
Date:	February 2025 – February 2026

Type of Matter:	Expert in Optics and Displays for Defendants
Client:	ACER Inc., ASUSTek Computer Inc., MSI Co. Ltd
Case Name:	SVV Technology Innovations, Inc. v. Acer Inc., 6:22-cv-00639; 6:22-cv-00640; 6:22-cv-00641; SVV Technology Innovations, Inc. v. ASUSTeK Computer Inc., 6:22-cv-00311; 6:22-cv-00312; 6:22-cv-00313; SVV Technology Innovations, Inc. v. Micro-Star International Co., Ltd., 6:22-cv-00511; 6:22-cv-00512; 6:22-cv-00513
Services:	Three expert reports, 2 depositions, court testimony
Date:	July 2023 - Present

Type of Matter:	Expert in Optics and Displays for Respondent
Client:	Manufacturing Resources International, Inc.
Case Name:	ITC 337-TA-1349 Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., Samsung Research America, Inc., Samsung International, Inc. v Manufacturing Resources Intl., Inc.
Services:	Two expert reports, one deposition
Date:	February 2023 – August 2023

Type of Matter:	Expert in Lighting for Petitioner
Client:	Grimco, Inc.
Case Name:	IPR2021-00968 Grimco, Inc. v Principal Lighting Group, LLC
Services:	Two declarations, one expert report, one deposition
Date:	February 2021 – January 2023

Type of Matter:	Expert in Optics and Lighting for Patent Owner
Client:	Ultravision Technologies, LLC
Case Name:	Acuity Brands Lighting, Inc. v. Ultravision Technologies, LLC IPR2020-01638
Services:	One declaration, one deposition
Date:	March 2021 – September 2021

Type of Matter:	Expert in Optics and Lighting for Defendant
Client:	Ultravision Technologies, LLC
Case Name:	Acuity Brands Lighting, Inc. v. Ultravision Technologies, LLC (1:19-cv-02207)
Services:	One declaration, one deposition
Date:	March 2021 – September 2021

Type of Matter:	Expert in Optics and Lighting for Plaintiff
Client:	Fabricant LLP and Brown Rudnick LLP
Case Name:	Ultravision Technologies, LLC v. Holophane Europe, Acuity Brands Lighting De Mexico, Arizona (Tianjin) Electronics Products Trade Company Ltd (2:19-cv-00291), Yaham Optoelectronics Co. Ltd., (2:18-cv-00118) Samsung Electronics Co. Ltd., and Samsung Display Co. Ltd., (2:19-cv-00252)
Services:	5 expert reports, 3 depositions, one declaration, consulting
Date:	February 5, 2020 – April 2021

Type of Matter:	Expert in Optics and Lighting for Petitioner
Client:	Banner & Witcoff, Ltd.
Case Name:	IPR2019-00747 Clear-Vu Lighting LLC v Kenall Manufacturing Company and University of Strathclyde
Services:	One declaration
Date:	November 2018 – October 2019

Type of Matter:	Expert in Optics and Lighting for Plaintiff
Client:	Finnegan, Henderson, Farabow, Garrett & Dunner LLP
Case Name:	ITC Inv. No. 337-TA-1081 Philips Lighting North America Corporation and Philips Lighting Holding B.V v. Feit Electric Co. Inc., Satco Products, Inc., Topaz Lighting Corp., Wangs Alliance Corp (WAC Lighting), WAC Lighting(Shanghai) Co. Ltd., Lowe's Companies, L G Sourcing, MSi Lighting, Inc., RAB Lighting Inc.
Services:	Work toward expert report
Date:	March 2017 – May 2018

Type of Matter:	Expert in Optics and Lighting for Petitioners
Client:	Schiff Hardin LLP
Case Name:	IPR2017-01287, IPR2017-01285, IPR2017-01280, Technical Consumer Products, Inc., Nicor Inc., Amax Lighting, Inc. v. Lighting Science Group Corporation
Services:	Declarations for three IPR Petitions, Deposition, Consulting
Date:	March 2017 – Present

Type of Matter:	Expert in Optics and Lighting for Plaintiff
Client:	McKool Smith, P.C.
Case Name:	Ultravision Technologies, LLC v. Lamar Advertising Company (2:16-cv-374-JRG-RSP)
Services:	Two declarations, Product analysis, Work toward expert report
Date:	April 2016 – July 2017

Type of Matter:	Expert in Optics for Senior Party
Client:	Foley and Lardner LLP
Case Name:	USPTO Patent Interference 105,972, Morgan Solar Inc. v Banyan Energy.
Services:	Two declarations, Consulting, Two-day deposition
Date:	March 2104 – September 2015

Type of Matter:	Expert in Optics for Petitioner
Client:	Fried, Frank, Harris, Shriver & Jacobson
Case Name:	IPR2015-01044, Mercedes-Benz v. IDT LLC
Services:	One Declaration
Date:	April 2015 – June 2015

Type of Matter:	Expert in Optics for Petitioner
Client:	Finnegan, Henderson, Farabow, Garrett & Dunner LLP
	IPR2015-00831, IPR2015-00832, IPR2015-00834, IPR2015-00835, IPR2015-00843, IPR2015-00855, IPR2015-00857, IPR2015-00897, Toyota Motor Corp. v IDT LLC
Services:	Eight Declarations, Consulting
Date:	May 2014 – May 2015

Type of Matter:	Expert in Optics for Defendant
Client:	Steptoe & Johnson LLP
Case Name:	ITC 337-TA-805, ITRI v. LG Corp.
Services:	Non-testifying consulting
Date:	Dec. 2011 – May 2013