Rolf Biernath, PhD

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https://www.linkedin.com/in/rolfbiernath

Passionate, results-focused, and collaborative science, technology, and engineering professional with expertise in defining and solving complex customer problems and forecasting impacts of technology trends. 56 US patents demonstrate a history of developing innovative practical solutions to meet customers' current and future needs. Consults with clients to improve and expand their business. Excels in a broad range of science, technology, and engineering disciplines and is a quick study in new ones. Skilled in building relationships and communicating with customers, suppliers, and integrators to fully define technical advances and bring innovations to market. Supports and guides project teams and motivates product developers to produce groundbreaking innovation on time and within budget. Skilled at explaining complex technology to non-experts.

CAREER HISTORY

Biernath Consulting, Inc.
St. Paul, MN

Science, Technology, and Engineering Collaborator
2016-present

3M Corporation
St. Paul, MN

Product Line Technical Development Leader
Connected Automation & Digital Solutions Lab
2020 – 2022

Product Line Creation Technical Leader
2017 - 2020

Other Advanced Technical Development Roles
1990 - 2016

EDUCATION

Univ of California, Berkeley
Ph.D. in Chem Engr.

Georgia Institute of Technology, Atlanta
B.S. in Chem Engr.
High Honors

Scrum Inc.
Scrum Product Owner Certification

EXPERTISE

- Rapidly getting up to speed on new science and technologies to make quick progress in defining problems, identifying root causes and customer needs, and generating viable solutions.
- Solving complex science, technology, and engineering problems with attainable solutions.
- Quickly delivering value to B2B customers – from short-term fixes getting production going again through to the long-term and cost-effective.
- Defining, validating, and developing new-to-world products and product lines that create new growth:
    - Customer Insight Interviews and the Jobs-to-be-Done framework.
    - Leading teams through systematic innovation in virtual environments.
    - Rapid prototyping of critical components and systems.
- Coaching and leading R&D teams to develop front-end technology including assessing intellectual property, finding IP workarounds, and developing comprehensive patent applications. Technical and IP Strategy Development.
- Technical expertise includes:
    - Applied AI tools – capabilities; AI enhancement & integration
    - Applied Physics, Metrology, light sources, optical sensors (visible, near-IR, mid-IR), LIDAR and 3D Imaging, IoT devices, and 3D printing.
    - Creating physics-based computer models and digital twins.
    - Cannabis Preservation; terpenes, active components, precursors.

KEY SUCCESSES

- 56 U.S. Patents in a broad range of technologies and products, including an IoT-informed physics model predicting replenishment needs, novel Optical Sensors (visible, near-IR, mid-IR), Optical Sensor Camouflage, Optical Films, Sunlight-visible Digital Displays, Adhesives & Tapes, Microfluidics, Electronic Packaging, and Automated License Plate & Traffic Sign Recognition.
- At 3M, collaborated closely with B2B and B2C Business Groups and many of the major 3M labs: Connected Automation, Electronic Materials, Adhesives & Tapes, Microreplication, Display & Graphics, Electronics & Energy, Incubator.
- Presented on AI tools at Applied AI Conference 2023, ASQ Conference 2023
- Invented a solution that grew client's business by 50% and another that reduced product cost by 98% while simplifying its operation.
- Prototyping Lab: electronic, mechatronic, and optoelectronic and test.

HOW WE CAN WORK TOGETHER

- Flexible, On-Call Rapid-Response Expert to tackle production, design issues, or IP issues
- Objective independent evaluation of new business concepts and underlying technologies
- Fractional CTO | Fractional Senior Scientist | Applied AI Product Integration
- Provide second level of review, oversight, and coaching for engineering teams

QUALIFICATION SUMMARY

HIGHLIGHTS

Chemical Engineering (Polymer Science & Engineering) PhD from University of California, Berkeley; BS ChE from Georgia Institute of Technology.

Over 30 years creating new products at 3M, last 3 years in Connected Automation Group.

Extensive patent portfolio and experience evaluating infringement analysis.

Inventor on 56 issued US Utility Patents in diverse fields including:

Micro-Fluidic surfaces and electronic circuits for microbiological testing.

Form-in-place Epoxy Rubber Gasket – used in vast majority of hard disk drives made late 90's onward and eliminated die cut gaskets.

Automatic and predictive selection and replacement for optimal humidity control (IoT / Digital Twin) for Cannabis preservation.

Outdoor-Visible Display Technologies – LCD and E-paper (electrophoretic).

Invisible, Machine-Readable Coding System - helps self-driving cars accurately read road signs.

Optical sensor camouflage – polymer films that hide IR imaging sensors from view (driver attention monitoring and privacy improvement; ADAS & LIDAR camo).

Electronic Circuit Board in-plane connectors for ultrahigh frequency I/O.

Birefringent polymer optical elements and films for polarization beam splitting and imaging applications; processes for making the birefringent optical films.

Specialty optical sensors for industrial applications – IIoT and connected automation.

INDUSTRY

Dr. Rolf Biernath has over 30 years of experience developing cutting-edge new products for 3M. He's been issued 56 US patents including 2 that were written outside of 3M. He has led teams to develop IP in a broad range of areas.

Founder and CTO of science and technology consulting, Biernath Consulting, Inc. (BCI). CTO at safety messaging startup, EFX Applied Technology. CTO at stealth-mode startup developing a Med-tech product for evaluating Traumatic Brain Injuries (TBIs) such as concussions.

EDUCATION

Doctor of Philosophy – Chemical Engineering 1990
University of California, Berkeley. Berkeley, CA.

Concentration: Polymer Science & Engineering and Material Science.

Thesis: Cure Chemistry and Mechanical Stress in Epoxy Novolac Thin Films.

Adviser: Dr. David Soane.

GPA: 4.0

Bachelor of Science – Chemical Engineering 1985
Georgia Institute of Technology, Atlanta, GA.

Cooperative Education Program (IBM, Burlington VT).

High Honors.

GPA: 3.72

INTELLECTUAL PROPERTY EXPERTISE

Prior art search
IP strategy; Claim strategy
Developing comprehensive utility patents
Assessing competitive intellectual property landscapes
Patent Design-Arounds – Designing invention workarounds to help develop stronger patent applications
Scientific leadership in "Patent Busting" exercises
Product teardowns and reverse engineering

TECHNICAL DOMAIN EXPERTISE

Applied Physics
Metrology
Optical Illumination (visible, near-IR, mid-IR)
Optical Sensors, Imaging and nonimaging (visible, near-IR, mid-IR)
LIDAR and 3D Imaging
IoT devices and Industrial IoT (IIoT)
3D printing
Cannabis Preservation methods, physics, and chemistries: terpenes, active components, precursors, humidity
Chemical Engineering
Physics-based computer models and digital twins of processes and equipment
Applied AI tools – capabilities; AI enhancement & integration; AI tools for New Product Development
Rapid prototyping of critical components and systems

INDUSTRIES

Polymer Science and Engineering

Polymers, Thermosets, Engineering Polymers, Epoxies, Specialty Films, Adhesives, Silicones, Multilayer Films, Microreplicated Films

Chemical Engineering, Chemicals, and Materials

Formulation, Coatings & Coating Stresses, Nanomaterials, Characterization, Fracture Mechanics, Diffusion, Electrophoretics, PDLC

Optics

Lighting, Daylighting, Displays, LEDs, Lasers, LIDAR, Optical Films, Window Films, LCD Displays, Projection Displays, Optical Metrology and Characterization, Near-IR Imaging, Retroreflective Films, Birefringent Optics and Film

INDUSTRY ACTIVITIES

SOLUTIONS PLATFORM TECHNICAL LEAD
3M – Connected Automation Lab, St. Paul, MN ..... 2020 – present

Technical leader for developing new tape automation solutions. Working in close partnership with a business leader to identify customer pain points, understand the magnitude of the pain, and understand existing solutions or workarounds and their respective pros and cons. Meeting with customers and identifying development partners and using this to identify market gaps and opportunities. Led technical team to generate and qualify new solution concepts for the market space.

Initiated and proved out a novel, disruptive IIoT solution for detecting contamination of metal surfaces. The solution is 50x less expensive than the competitive analytical instrument it supplants for this application. Additionally, it is portable, lightweight, robust, and simple to use.

I led efforts to develop the next generation of solutions for tape automation, collaborating with cross-functional teams for new technology research, development, and scale-up. I interact with customers to understand requirements, processes, applications, and pain points. I identified development partners, market gaps, and opportunities. I spurred technical teams to generate new solution concepts and intellectual property, including patents and trade secrets. I directed industrial designers, design influencers, and engineers to develop multiple products to move from Exploration to Development.

Designed and developed custom manufacturing aid to reduce customer production defects while increasing process speed and reducing operator stress.

FOUNDER & CHIEF TECHNOLOGY OFFICER
Biernath Consulting, Inc. Wyoming, MN..... 2016 – present

Collaborate with startups and small businesses to help them invent their way to business growth using deep and broad scientific, engineering, and innovation expertise along with a strong business sensibility and customer insights.

Work alongside business and technical leaders to expand the scope of their current offerings, identify new opportunities, and invent new product platforms and categories. Work with CEO's, CTO's, and other CxO's in Startups, Small Businesses, and Large science-based companies.

Consulted for a chemicals-based company on a customer service problem that was usually resolved with a series of phone calls. I came up with a science-based computer model of their problem with predictive capabilities. This model reduced the number of customer service phone calls from an average of four down to one. The solution was inventive and is in the process of being patented.

Created an engineering-based value model for their primary product line; this is being used by their marketing and sales to demonstrate how their product provides their customers a 10x ROI. It's been a tremendous sales aid and was one component of their marketing strategy which enabled their company nearly double in size in one year. This work resulted in a patent application around automatic ordering of consumables based on predicted and measured performance.

Advised a startup that serves organizations such as "Doctors Without Borders" with record-keeping for the patients. The doctors and nursing staff frequently do not travel to the same locations, and paper records and identification papers are easily lost or stolen in the 3rd world countries they work in. The patients usually have no photo ID and their fingerprints are often damaged and change due to hard working conditions. I recommended using mobile iris scanning as their method of patient identification. They are moving forward with that recommendation now and it appears to be the solution going forward.

PRODUCT PLATFORM TECHNICAL LEADER
3M – Connected Automation Lab, St. Paul, MN .....2019 – 2020

Technical leader for a newly prioritized opportunity in the Connected Automation and Digital Solutions Lab in the Industrial Adhesives and Tapes Division. Led a white space exploration team to identify, assess, and ultimately recommend new investment themes in the area of Connected Automation for the division. Worked in close partnership with the Business lead to guide the team to define a new development program pertinent to our division's customer base. The team explored the intersection between insights into our customer needs, their current development trajectories, and Industry 4.0 development trends impacting the entire industry. We successfully defined a new development program that will enable the division to become a highly valued partner to our customers as they grow in their automation capabilities. Communicated learnings and program progress to senior leadership. This resulted in launch of a development team to implement the strategic recommendations going forward.

PRODUCT PLATFORM CREATION LEADER
3M – IATD New Horizons Lab, St. Paul, MN .....2017 – 2019

Technical leader for a top 10 division New Product Development program, in the Industrial Adhesives and Tapes Division. This scope of the program was international with research, development, and customer engagement. Worked with insights team to gain deep understanding of the customers, their processes, and their decision criteria. Identified customer needs, delighters, and exciters in the target market. Worked onsite with customers to assess new products. Communicated learnings and program progress to senior management. Actively engaged with business development team throughout course of program. Program resulted in development of a new-to-the-world 3D printing material and in-process patent filings.

SENIOR RESEARCH SPECIALIST
3M – Electronics & Energy Business Lab Incubator, St. Paul, MN.....2015 –2016

Managed initial business and technology relationship with vendor partner, benefitting the program with close management-level and bench-level collaboration to bring a new optical product category to market. Net results: Doubling of product forecast to $100MM.

Spearheaded technical development of new applications of a recently invented materials technology on the product commercialization team. Established and quantified design parameters critical to product function and identified new applications for the product. Resulted in competitive funding through a Genesis grant, ultimately earning a Golden Acorn.

Drove a New Technology Product Development to a rapid first proof of manufacturing feasibility on a pilot line. Validated technical and manufacturing feasibility and assessed the customer value proposition several months earlier than scheduled.

Presented novel optical technologies and product concepts during customer visits and validated value propositions through customer demonstrations. Result: enthusiastic, validated new business in the queue.

Drove IP assessment as core member in a competitor patent busting team. Resulted in a decision to go to market with a $50 MM product.

SENIOR RESEARCH SPECIALIST
3M – Electronics & Energy Business Lab Incubator, St. Paul, MN.....2012 – 2015

Researched, developed, and analyzed new business opportunities in several industries. Developed, prioritized, and made recommendations of new business opportunities, resulting in 2 major Division level programs in two different divisions, and several other program proposals which are being further explored.

Developed Value Delivery Streams and SWOTs to identify new product strengths & weaknesses. Estimated product adoption timelines. Successfully transferred the projects to the respective management teams and marketing groups in the receiving Divisions.

Assessed startups' and incumbents' business models and technologies, which enabled generation of

opportunity areas for 3M as well as areas for strategic collaboration with startups.

Defined key customer jobs and drew linkages to external companies and 3M capabilities, enabling high value solutions that maximized 3M unique value contribution.

Proposed complete system design for a new OEM product platform. Results: Incorporation of system design into Division strategic plan.

Example project: Smart, Green Buildings & Advanced Building Materials, Components, and Systems

Attended American Institute of Architects (AIA) Annual Convention in Chicago and in Atlanta (2 years) to gather insights on how architects and building engineers make decisions about incorporating new technologies, especially focused on windows and natural lighting.

Worked with business and marketing to identify new business opportunities, especially in daylighting and illumination

Led team through brainstorming in areas of internal artificial illumination and pushing natural daylight deeper into the building.

Modeled the power and cost savings potential of the system such that optimal performance predictions could be made for different scenarios such as different latitudes, weather, and variable cost basis of electricity.

SENIOR RESEARCH SPECIALIST
3M – Display and Graphics Lab, St. Paul, MN.....2009 – 2012

Invented ways to embed machine readable codes that are nearly invisible to the eye, yet enable substantially more accurate automated license plate character, state, and style recognition. Result was a successful transfer of the program to commercializing unit where it has undergone extensive field-testing and evaluation for commercial products, showing high reliability and enormous commercial potential.

Invented and ran an accelerated product development program to bring a new incubator concept through technology development to pre-manufacturing scale up.

Drove the program at a rate of a new prototype each month over the development period, which enabled management and early-stage customers to see concept form and function and provide rapid feedback.

Recruited the 3M International Design Group to create product concept drawings of a new technology for use at places such as Disney, fast food drive-throughs and public information portals. This resulted in professional quality design form factors.

Presented the designs to potential key customers. One outcome was a key customer chose one of the designs for field testing at their site, and additional customers engaged around the application.

Worked closely with customers, business team, suppliers, and system integrators to develop pre-manufacturing and scale-up plans, enabling us to rapidly deliver the field-test units.

Drove fabrication of the system from lab through to on-site installation at customer site of a complete manufacturable system, resulting in the system successfully performing in harsh weather during yearlong field test.

Invented and developed next generation digital communication solutions which reduced manufacturing cost by 50% and dramatically simplified customer installation. Modeled the optics of the imaging system using a combination of Zemax and Matlab, thereby enabling a uniform, non-distorted image using folded optics.

ADVANCED RESEARCH SPECIALIST
3M – Display and Graphics Lab, St. Paul, MN.....2001 – 2009

Identified future needs by customer discussions. Result: Led several product development teams to invent, research, and optimize product prototypes in areas of: LED Backlights and LED Illumination systems, Birefringent Optics, and Micropatterned Optics

RESEARCH SPECIALIST
3M – Microreplication Technology Center, St. Paul, MN *r*.....1997 – 2001

Researched, invented, generated, and assessed prototypes in areas of:

Bi-stable Electronic Displays (E-Paper) including electrophoretic and electrostatic

Electronic Paper (E-Paper) collaboration with Xerox Corp.

Switchable retro-reflective optics for outdoor signage. Collaboration with University of British Columbia.

RESEARCH SPECIALIST
3M – Adhesives Technology Center, St. Paul, MN.....1995 – 1997

Invented and developed a first-of-its-kind Silicone rubber replacement material. Identified needs through Division-led customer phone discussions. Recruited and led high performing team of PhD Chemists to quickly develop an epoxy-based rubber formulation for the electronics industry. Ran the team on a two-week development cycle with new formulations delivered at the end of each cycle. Result: Commercialized product eliminated a huge industry waste stream and enabled much faster and more reliable performance to customer. Product generated very high margins over more than 10 years.

SENIOR RESEARCH ENGINEER
3M – Electronic Materials Applications Lab, St. Paul, MN.....1990 – 1995

Developed novel electronic interconnects including 3D connectors and ball grid array (BGA)

Injection molding of engineering thermoplastics such as ULTEM and PPS – included mold design, material selection, and process optimization.

Electroplating of these engineering thermoplastics including novel patterning techniques.

Specialty Electronic connectors, namely Separable Inter-Laminate Connectors (SILC) that enabled >1.2 GHz speeds throughout the connector and circuit board. At the time, this was 3x faster than other connectors could attain. (Inventor and Technical Team Lead)

GRADUATE STUDENT INTERN
Shell Development, Houston, TX 1987

Invited to work with world class epoxy developers and formulators from Shell Development Labs

Researched specialized epoxies for electronics applications. Used FTIR and dielectric spectroscopy to monitor cure. Identified intermediate molecular states and built a reaction kinetics and crosslinking model that described and predicted mechanical property development over the course of the polymer crosslinking reaction.

UNDERGRAD ENGINEER INTERN
IBM, Burlington, VT .....1982 – 1985

Numerous 3 to 6-month assignments. (>2 years accrued work experience)

Developed and qualified automatic process endpoint detection methods for chemically reactive systems using Lasers, Optical Emission Spectroscopy, and Dielectric Spectroscopy.

Developed liquid and plasma etching processes for Silicon Nitride, SiO2, and Aluminum.

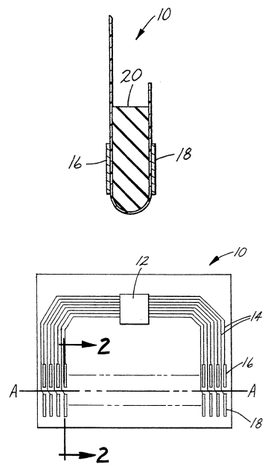
governmental agencies.

ISSUED PATENTS

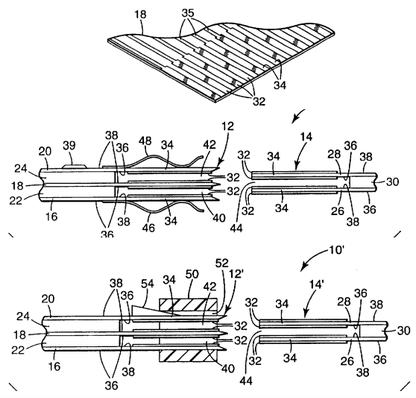
1. US 11686891 Angularly and spectrally selective detector and light source systems
2. US 11640019 Spectrally selective retroreflective system
3. US 11366257 Optical filters complementary angular blocking regions
4. US 11187576 Optical filters having spatially variant microreplicated layers
5. US 11163099 Spectrally selective light control film
6. US 11016229 Optical filter
7. US 11009637 Optical stack
8. US 10909607 Systems, methods and devices for controlling humidity in a closed environment with automatic and predictive identification, purchase and replacement of optimal humidity controller
9. US 10495801 Patterned marking of multilayer optical film by thermal conduction
10. US 10417534 Optically active materials and articles and systems in which they may be used
11. US 10254460 Patterned marking of multilayer optical film by thermal conduction
12. US 10018762 Patterned marking of multilayer optical film by thermal conduction
13. US 9992463 Alignments for a projection system with a shaped projection screen using alignment content
14. US 9879157 Microstructured transfer tapes
15. US 9864120 Patterned marking of multilayer optical film by thermal conduction
16. US 9581740 Optically active materials and articles and systems in which they may be used
17. US 9541698 Backlights having selected output light flux distributions and display systems using same
18. US 9222650 Switchable light-duct extraction
19. US 9091408 Recycling backlights with semi-specular components
20. US 9028108 Collimating light injectors for edge-lit backlights
21. US 8926159 Thin hollow backlights with beneficial design characteristics
22. US 8919969 On-product projection for digital merchandizing
23. US 8865293 Optically active materials and articles and systems in which they may be used
24. US 8740442 Backlight and display system using same
25. US 8608363 Recycling backlights with semi-specular components
26. US 8608362 Collimating light engine
27. US 8599483 High angle rear projection system
28. US 8523419 Thin hollow backlights with beneficial design characteristics
29. US 8469575 Backlight and display system using same
30. US 8384852 Hybrid daylight-coupled backlights for sunlight viewable displays
31. US 8339542 Passive and hybrid daylight-coupled N-stack and collapsible backlights for sunlight viewable displays
32. US 8228463 Passive daylight-coupled backlight with turning film having prisms with chaos for sunlight viewable displays
33. US 8192048 Lighting assemblies and systems
34. US 8149351 Passive and hybrid daylight-coupled backlights for sunlight viewable displays

35. US 8068187 Stereoscopic 3D liquid crystal display apparatus having a double sided prism film comprising cylindrical lenses and non-contiguous prisms
36. US 7843637 Birefringent structured film for LED color mixing in a backlight
37. US 7418202 Article having a birefringent surface and microstructured features having a variable pitch or angles for use as a blur filter
38. US 7220344 Film based addressable programmable electronic matrix articles and methods of manufacturing and using the same
39. US 7057599 Microstructures with assisting optical lenses
40. US 6761962 Microfluidic articles
41. US 6700695 Microstructured segmented electrode film for electronic displays
42. US 6664318 Encapsulant compositions with thermal shock resistance
43. US 6577432 Post and pocket microstructures containing moveable particles having optical effects
44. US 6570700 Microstructures with assisting optical elements to enhance an optical effect
45. US 6480322 Method of improving the respondability of moveable structures in a display
46. US 6462859 Electromagnetically responsive particle assembly and methods and articles for manufacture and use
47. US 6451191 Film based addressable programmable electronic matrix articles and methods of manufacturing and using the same
48. US 6403226 Electronic assemblies with elastomeric members made from cured, room temperature curable silicone compositions having improved stress relaxation resistance
49. US 6375871 Methods of manufacturing microfluidic articles
50. US 5876215 Separable electrical connector assembly having a planar array of conductive protrusions
51. US 5839263 Lawnmower blade with replaceable knives
52. US 5827084 Electrical connector assembly with interleaved multilayer structure and fabrication method
53. US 5741148 Electrical connector assembly with interleaved multilayer structure and fabrication method
54. US 5736191 Microridge abrasion for selective metalization
55. US 5433632 Flexible circuit connector
56. US 5345364 Edge-connecting printed circuit board

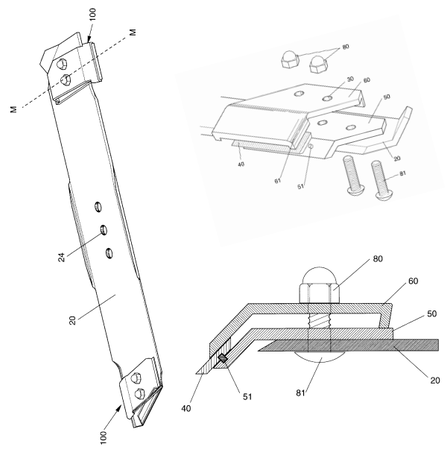
US 5433632
Flexible circuit connector



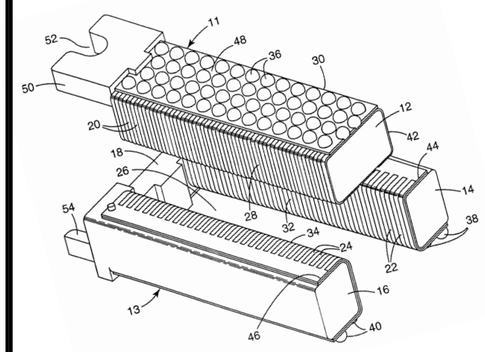
US 5741148
Electrical connector assembly with interleaved multilayer structure and fabrication method



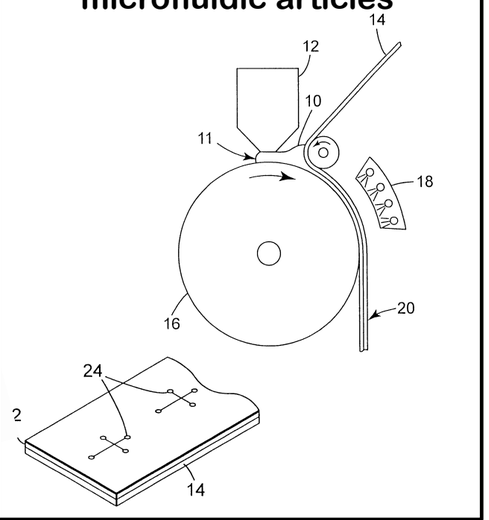
US 5839263
Lawnmower blade with replaceable knives



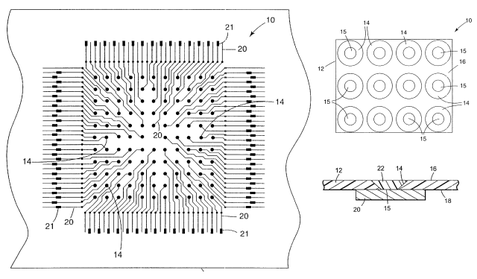
US 5876215
Separable electrical connector assembly having a planar array of conductive protrusions



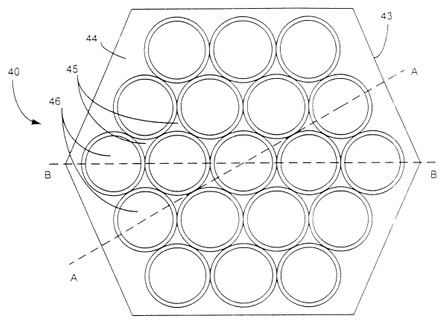
US 6375871
Methods of manufacturing microfluidic articles



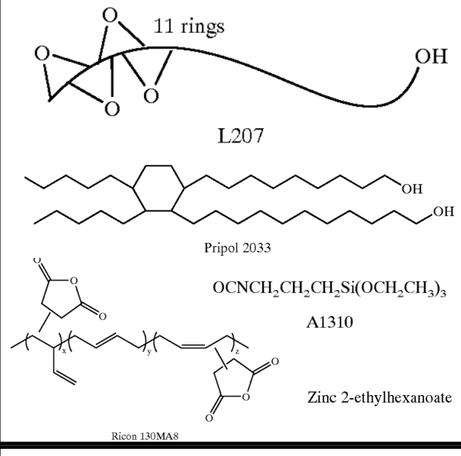
US 6451191
Film based addressable programmable electronic matrix articles and methods of manufacturing and using the same



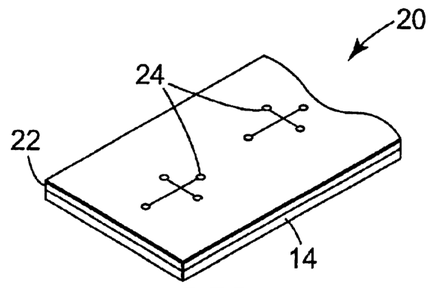
US 6577432
Post and pocket microstructures containing moveable particles having optical effects



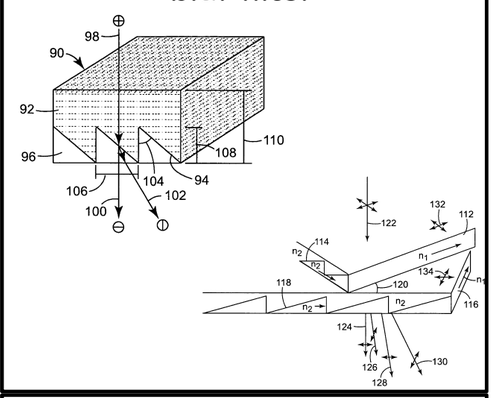
US 6664318
Encapsulant compositions with thermal shock resistance



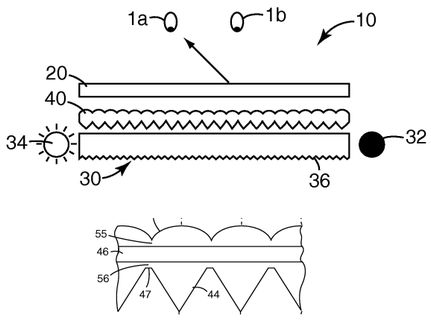
US 6761962
Microfluidic articles



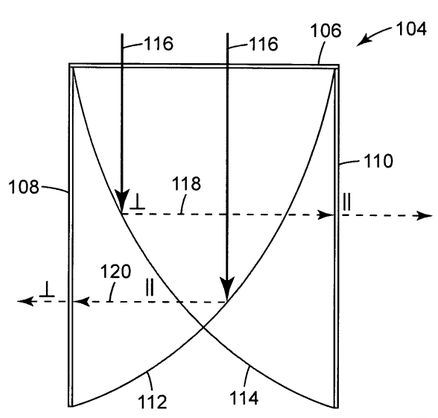
US 7418202
Article having a birefringent surface and microstructured features having a variable pitch or angles for use as a blur filter



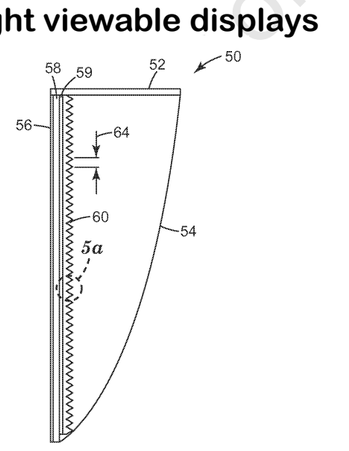
US 8068187
Stereoscopic 3D liquid crystal display apparatus having a double sided prism film comprising cylindrical lenses and non-contiguous prisms



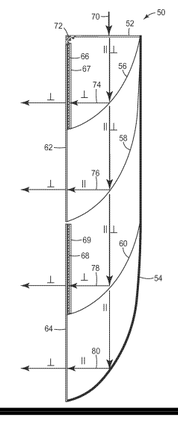
US 8149351
Passive and hybrid daylight-coupled backlights for sunlight viewable displays



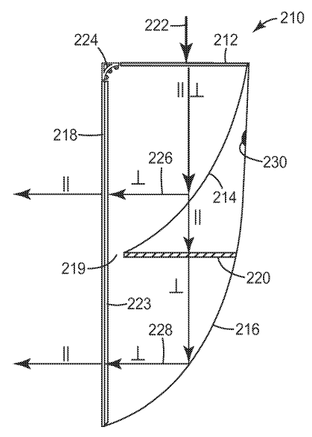
US 8228463
Passive daylight-coupled backlight with turning film having prisms with chaos for sunlight viewable displays



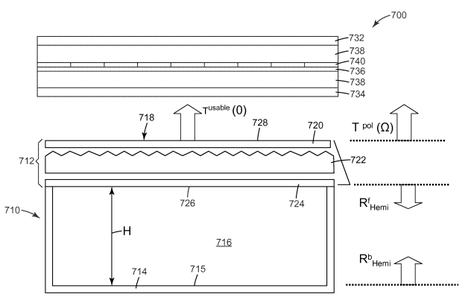
US 8339542
Passive and hybrid daylight-coupled N-stack and collapsible backlights for sunlight viewable displays



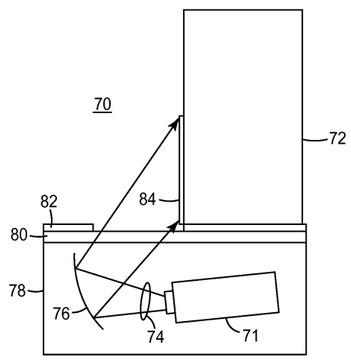
US 8384852
Hybrid daylight-coupled backlights for sunlight viewable displays



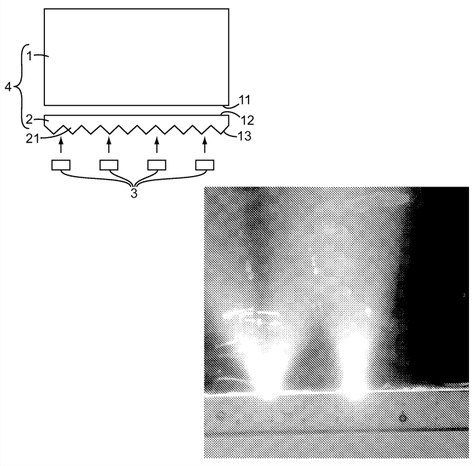
US 8523419
Thin hollow backlights with beneficial design characteristics



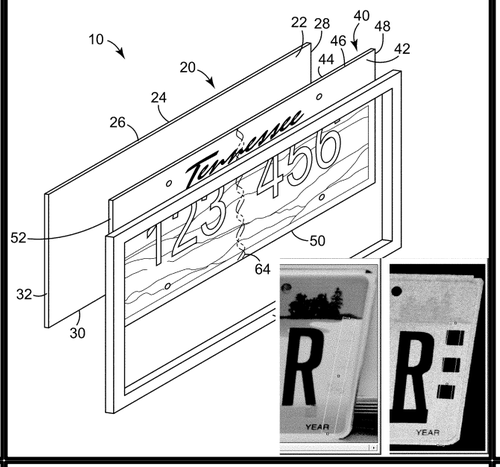
US 8919969
On-product projection for digital merchandizing



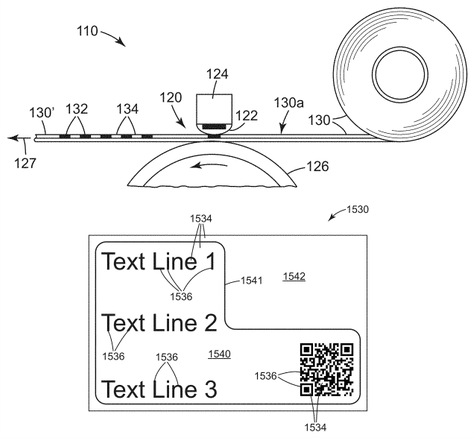
US 9879157
Microstructured transfer tapes



US 10417534
Optically active materials and articles and systems in which they may be used



US 10495801
Patterned marking of multilayer optical film by thermal conduction



US 10909607
Systems, methods and devices for controlling humidity in a closed environment with automatic and predictive identification, purchase and replacement of optimal humidity controller

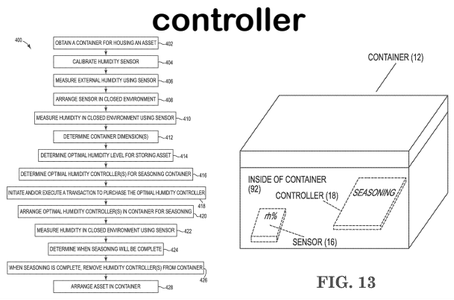


FIG. 13

US 11163099
Spectrally selective light control film

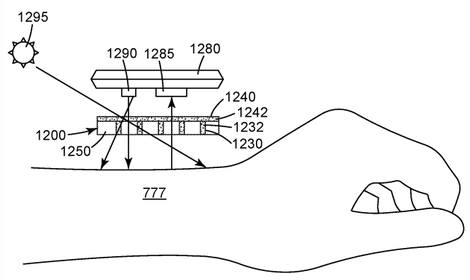
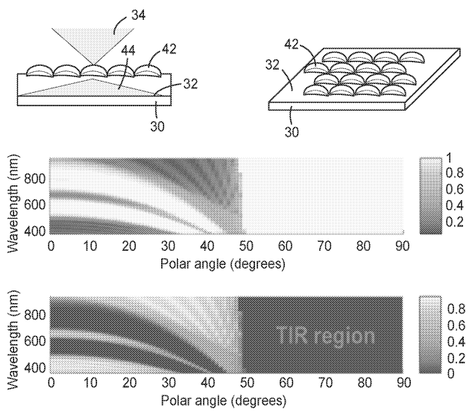
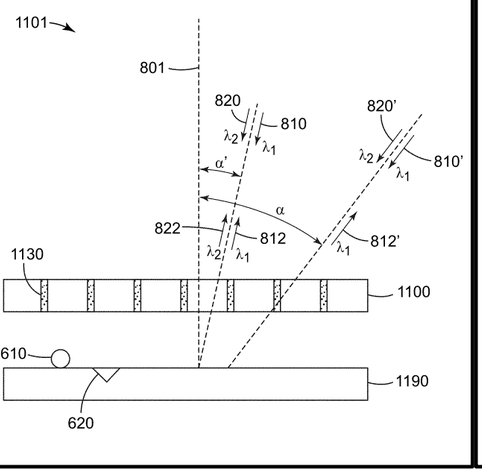


Fig. 12

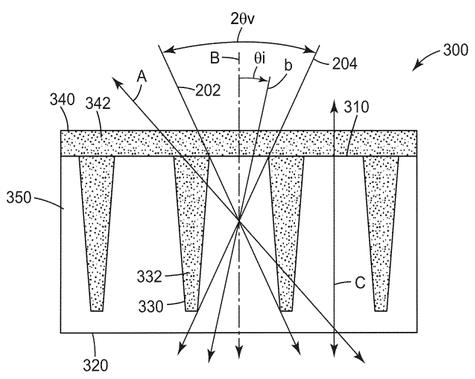
US 11187576
Optical filters having spatially variant microreplicated layers



US 11640019
Spectrally selective retroreflective system

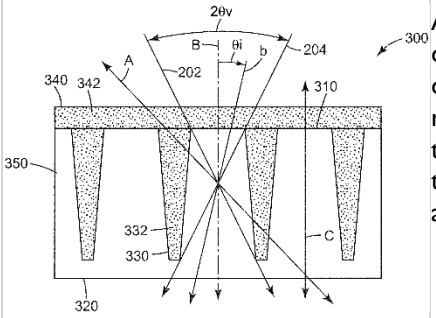


US 11686891
Angularly and spectrally selective detector and light source systems



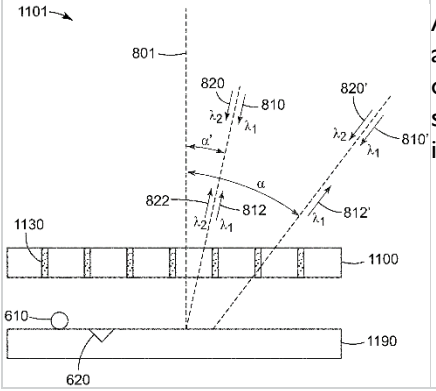
	Technologies		Products Worked On
	Accelerated Aging of Electronics		3D Imaging
	Additive Manufacturing		3D Printers
	Cannabis, tobacco, and herb preservation		3D Scanners
	Chemical Engineering		Aircraft Components
	Data Analysis		Automobile Components
	Electronic Displays		Autonomous Vehicles
	Electronic Interconnect		Batteries
	Failure Analysis		Battery Manufacturing Equipment
	Generative AI applications		Biometrics
	Glare management / Stray light management		Birefringent optical components
	Humidity controllers		Covert markings and indicators
	Image Processing		Daylighting films and components
	IoT & IIoT (Industry 4.0)		Diamond Turning Machines
	Jig and Fixture design		Digital Cameras - near IR
	LASERs - solid state		Digital Cameras - thermal
	LEDs - programmable		Digital Cameras - visible
	Material Science & Polymer Engineering		Disk Drives
	Mechatronics		Elastomers
	Metrology		Electronic component packaging
	Mid-IR sensors		Electronic Connectors
	Near-IR sensors		Electronic Interconnect
	Optical Films		Electrophoresis Machines
	Optical imaging sensors		Flex Circuits
	Optical Polarizers		Forklifts
	Optical sensors		Foundry Ovens
	Optical wavelength filters		Home Products
	Optical waveplates		Injection Molding Machines
	Optics		Interferometers
	Physics		IoT Devices
	Polymer Science & Engineering		iPhone
	Polymer Aging and Failure Analysis		License plates
	Process Controls		LIDAR
	Product Development		Machine Tools
	Projection systems - optical		Machining Equipment
	Proof of Concept		Microcontrollers
	Prototyping		Microfluidics
	Rapid Prototyping		Optical filters
	Reflective Signage		Optical Sensors
	Renewable Energy - Solar		Plasma Etching
	Retroreflective signage		PLCs
	Robotics - practitioner		Printed Circuit Boards
	Smart Manufacturing		Road signs
	Specialty Adhesives		Robotics Arms
	Specialty Tapes		Solar Arrays
	Window Films - decorative		Spectrometers
	Window Films - solar		Wearable Consumer Products

US 11686891 - Angularly and spectrally selective detector and light source systems (2023-06-27)



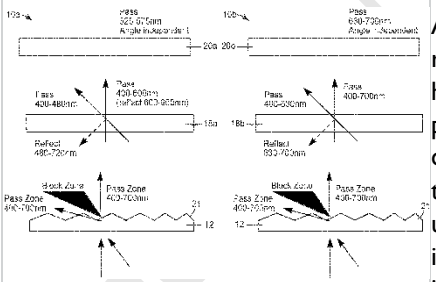
A detector system is described that includes a detector that is sensitive to wavelengths in a detection wavelength range. The detector system further includes a light control film that is disposed on the detector and includes a plurality of alternating first and second regions. Each first region has a width W and a height H, where H/W≥1. Each first region has a substantially low transmission in a first portion of the detection wavelength range and a substantially high transmission in the remaining portion of the detection wavelength range. Each second region has a substantially high transmission in the detection wavelength range.

US 11640019 - Spectrally selective retroreflective system (2023-05-02)



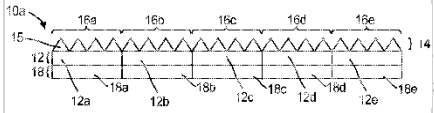
A retroreflective system is disclosed that includes a retroreflective sheet for retroreflecting light, and a light control film disposed on the retroreflective sheet. For a first wavelength, light incident on the light control film at each of a first and second angles of incidence is retroreflected. For a second wavelength, light incident on the light control film at the first, but not the second, angle of incidence is retroreflected.

US 11366257 - Optical filters complementary angular blocking regions (2022-06-21)



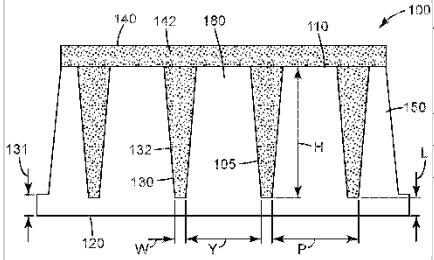
An example optical filter may include an angle blocking layer Slaving a first angular light blocking range θ_{AL} relative to a normal axis, and an interference filter adjacent the angle blocking layer having a second angular light blocking range θ_{IF} relative to the normal axis. θ_{IF} and θ_{AL} at least partially overlap. The example optical filter has a predetermined light transmission zone comprising angles from 0° to a maximum light transmission angle θ_{Tmax} relative to a normal axis of the major surface. The example optical filter has a predetermined angular light blocking zone θ_B, a union of θ_{IF} and θ_{AL}. An example optical filter may include an interference filter having an incidence angle-dependent reflection band and an absorbing layer having an absorption band. The incidence angle-dependent reflection band and the absorption band may overlap at least one wavelength at least one angle of incidence.

US 11187576 - Optical filters having spatially variant microreplicated layers (2021-11-30)



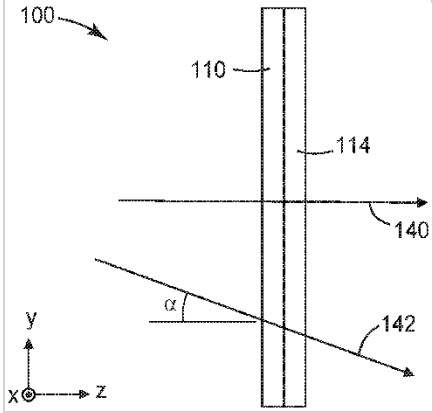
In an example, an example article may include a spatially variant microreplicated layer optically coupled to a wavelength selective filter. The wavelength selective filter may have a light incidence angle-dependent optical band. The spatially variant microreplicated layer may be configured to transmit light to a first optical region of the wavelength selective filter at a first predetermined incidence angle and to a second optical region of the wavelength selective filter at a second predetermined incidence angle.

US 11163099 - Spectrally selective light control film (2021-11-02)



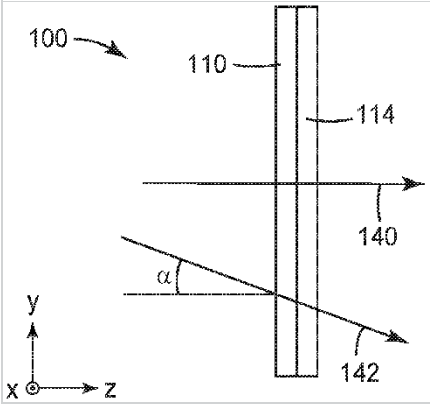
A light control film is disclosed that includes a plurality of spaced apart first regions. Each first region has a substantially low transmission in one or two of a first wavelength range from about 300 nm to about 400 nm, a second wavelength range from about 400 nm to about 700 nm, and a third wavelength range from about 700 nm to about 1200 nm, and a substantially high transmission in the remaining wavelength ranges. The light control film has a viewing angle of less than about 70 degrees along a predetermined first direction.

US 11016229 - Optical filter (2021-05-25)



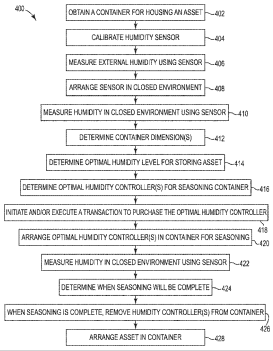
An optical filter including a polarizer and a visible light blocking filter is described. The polarizer is configured to transmit at least 60 percent of light in a first infrared wavelength range that is incident on the polarizer at normal incidence in a first polarization state, to transmit less than 30 percent of light in a second infrared wavelength that is incident on the polarizer at normal incidence in a second polarization state orthogonal to the first polarization state, and to transmit less than 30 percent of light in a third infrared wavelength range that is incident on the polarizer with a 50 degree angle of incidence in the second polarization state. The visible light blocking filter configured to transmit at least 60 percent of light in the first infrared wavelength range at normal incidence in the first polarization state.

US 11009637 - Optical stack (2021-05-18)



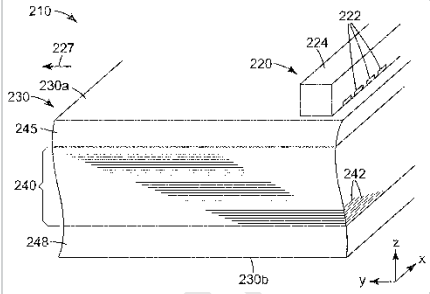
An optical stack including an oriented polymeric multilayer optical film and a non-birefringent optical filter is described. The oriented polymeric multilayer optical film has a first reflection band with a first band edge and the non-birefringent optical filter has a first blocking band. In some cases, the first blocking band contains the first band edge and the first blocking band provides a reduction in variation of a band edge of an overall blocking band of the optical stack.

US 10909607 - Systems, methods and devices for controlling humidity in a closed environment with automatic and predictive identification, purchase and replacement of optimal humidity controller (2021-02-02)



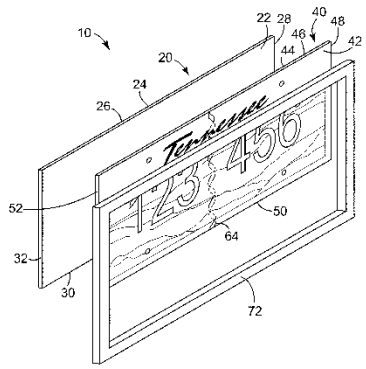
The invention relates to systems and methods for monitoring and providing humidity control for an asset within a closed environment such as a storage container, with transmission of sensed humidity levels to at least one server that stores current and historical humidity levels and comprises a processor and stored executable instructions that, when executed by the processor, may recommend an optimal humidity controller to use for the asset, determine when the recommended humidity controller requires replacement and predictively recommend an optimal replacement humidity controller based on at least historical humidity data and trending thereof, execution of a sales transaction, that may be pre-scheduled based on asset type, asset size and/or historical data, for the optimal replacement humidity controller, and providing the proper replacement humidity controller to the user.

US 10495801 - Patterned marking of multilayer optical film by thermal conduction (2019-12-03)



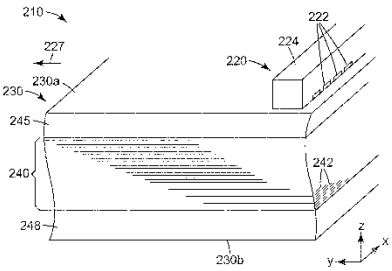
A multilayer optical film has a packet of microlayers that selectively reflect light by constructive or destructive interference to provide a first reflective characteristic. At least some of the microlayers are birefringent. A stabilizing layer attaches to and covers the microlayer packet proximate an outer exposed surface of the film. Heating element(s) can physically contact the film to deliver heat to the packet through the stabilizing layer by thermal conduction, at altered region(s) of the film, such that the first reflective characteristic changes to an altered reflective characteristic in the altered region(s) to pattern the film. The stabilizing layer provides sufficient heat conduction to allow heat from the heating elements to change (e.g. reduce) the birefringence of the birefringent microlayers disposed near the outer exposed surface in the altered region(s), while providing sufficient mechanical support to avoid substantial layer distortion of the microlayers near the outer exposed surface in the altered region(s).

US 10417534 - Optically active materials and articles and systems in which they may be used (2019-09-17)



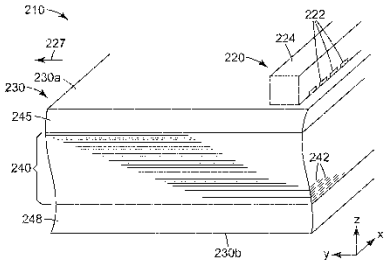
The inventors of the present application developed novel optically active materials, methods, and articles. One embodiment of the present application is an optically active article, comprising: an infrared-reflecting material positioned adjacent to an optically active substrate such that the infrared-reflecting material forms a pattern that can be read by an infrared sensor when the optically active substrate is illuminated by an infrared light source.
Another embodiment of the present application relates to a method of manufacturing an optically active article, comprising: obtaining an optically active sheeting; and positioning an infrared-reflecting material on the optically active sheeting to form a pattern. The optically active article may be, for example, a license plate.

US 10254460 - Patterned marking of multilayer optical film by thermal conduction (2019-04-09)



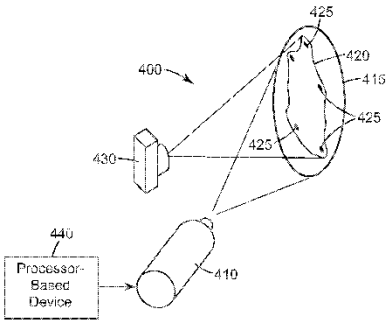
A multilayer optical film has a packet of microlayers that selectively reflect light by constructive or destructive interference to provide a first reflective characteristic. At least some of the microlayers are birefringent. A stabilizing layer attaches to and covers the microlayer packet proximate an outer exposed surface of the film. Heating element(s) can physically contact the film to deliver heat to the packet through the stabilizing layer by thermal conduction, at altered region(s) of the film, such that the first reflective characteristic changes to an altered reflective characteristic in the altered region(s) to pattern the film. The stabilizing layer provides sufficient heat conduction to allow heat from the heating elements to change (e.g. reduce) the birefringence of the birefringent microlayers disposed near the outer exposed surface in the altered region(s), while providing sufficient mechanical support to avoid substantial layer distortion of the microlayers near the outer exposed surface in the altered region(s).

US 10018762 - Patterned marking of multilayer optical film by thermal conduction (2018-07-10)



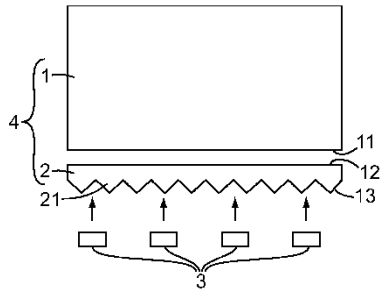
A multilayer optical film has a packet of microlayers that selectively reflect light by constructive or destructive interference to provide a first reflective characteristic. At least some of the microlayers are birefringent. A stabilizing layer attaches to and covers the microlayer packet proximate an outer exposed surface of the film. Heating element(s) can physically contact the film to deliver heat to the packet through the stabilizing layer by thermal conduction, at altered region(s) of the film, such that the first reflective characteristic changes to an altered reflective characteristic in the altered region(s) to pattern the film. The stabilizing layer provides sufficient heat conduction to allow heat from the heating elements to change (e.g. reduce) the birefringence of the birefringent microlayers disposed near the outer exposed surface in the altered region(s), while providing sufficient mechanical support to avoid substantial layer distortion of the microlayers near the outer exposed surface in the altered region(s).

US 9992463 - Alignments for a projection system with a shaped projection screen using alignment content (2018-06-05)



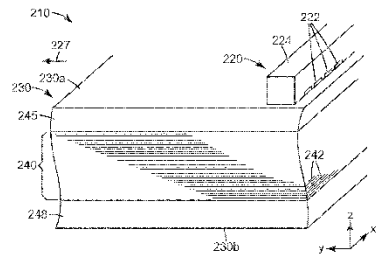
A projection system capable of projection alignment includes a projector, a shaped projection screen, an image sensor, and a processing unit. The projector is configured to project a series of alignment content to the shaped projection screen. The image sensor is configured to capture a series of projected alignment content. The processing unit is electronically coupled to the image sensor and configured to receive the series of captured alignment content and determine at least part of general boundary of the shaped projection screen based on the series of captured alignment content.

US 9879157 - Microstructured transfer tapes (2018-01-30)



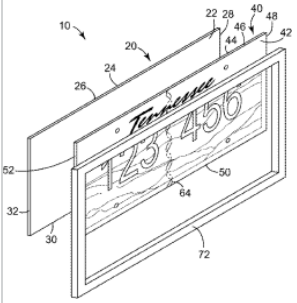
Transfer tapes include an optically transparent adhesive layer with a first major surface and a second major surface, with at least one of the major surfaces including a microstructured pattern that is a permanent feature of the adhesive surface. The microstructured surface alters the direction of light. The optically transparent composition may include a low Tg polymeric component with a Tg of less than 20° C., and an acid or base functionality, and a high Tg polymeric component with a Tg of greater than 20° C., and an acid or base functionality, such that the functionality of the low Tg polymeric component and the functionality of the high Tg polymeric component form an acid-base interaction when mixed. The transfer tapes can be adhered to substrates to provide a microstructured surface to the substrate surface.

US 9864120 - Patterned marking of multilayer optical film by thermal conduction (2018-01-09)



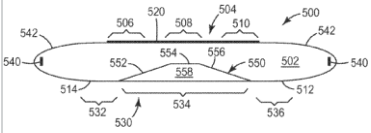
A multilayer optical film (**130**) has a packet of microlayers that selectively reflect light by constructive or destructive interference to provide a first reflective characteristic. At least some of the microlayers are birefringent. A stabilizing layer attaches to and covers the microlayer packet proximate an outer exposed surface of the film Heating elements (**122**) can physically contact the film to deliver heat to the packet through the stabilizing layer by thermal conduction, at altered regions of the film, such that the first reflective characteristic changes to an altered reflective characteristic in the altered regions to pattern the film The stabilizing layer provides sufficient heat conduction to allow heat from the heating elements to change (e.g. reduce) the birefringence of the birefringent microlayers disposed near the outer exposed surface in the altered regions, while providing sufficient mechanical support to avoid substantial layer distortion of the microlayers near the outer exposed surface in the altered regions.

US 9581740 - Optically active materials and articles and systems in which they may be used (2017-02-28)



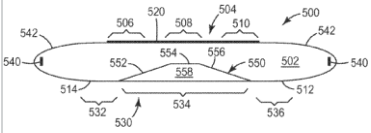
The inventors of the present application developed novel optically active materials, methods, and articles. One embodiment of the present application is an optically active article, comprising: an infrared-reflecting material positioned adjacent to an optically active substrate such that the infrared-reflecting material forms a pattern that can be read by an infrared sensor when the optically active substrate is illuminated by an infrared light source. Another embodiment of the present application relates to a method of manufacturing an optically active article, comprising: obtaining an optically active sheeting; and positioning an infrared-reflecting material on the optically active sheeting to form a pattern. The optically active article may be, for example, a license plate.

US 9541698 - Backlights having selected output light flux distributions and display systems using same (2017-01-10)



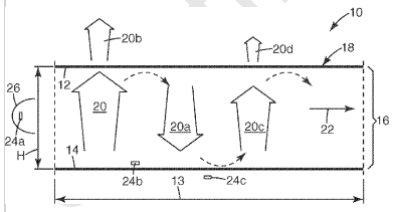
A backlight that includes a front reflector (120) and a back reflector (130) that form a hollow light recycling cavity including an output surface (104) is disclosed. At least a portion of the back reflector is non-parallel to the front reflector. The backlight also includes at l east one semi-specular element disposed within the hollow light recycling cavity, and one or more light sources (140) disposed to emit light into the hollow light recycling cavity, where the one or more light sources are configured to emit light into the hollow light recycling cavity over a limited angular range.

US 9222650 - Switchable light-duct extraction (2015-12-29)



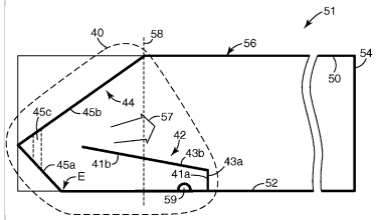
The disclosure generally relates to switchable light extractors and in particular to switchable light extractors useful for extracting light from light ducts used for interior lighting of a building. The disclosure also relates to lighting systems that include the light extractors, and methods of extracting light from a lighting system. The switchable light extractors generally include a first and a second reflective film, each having a plurality of voids that can aligned to extract light from a light duct.

US 9091408 - Recycling backlights with semi-specular components (2015-07-28)



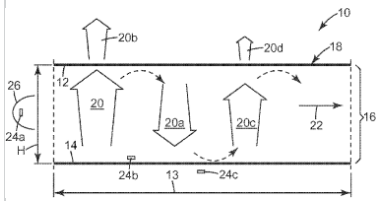
A recycling cavity such as used in a backlight or similar extended area source includes a front and back reflector, the front reflector being partially transmissive to provide an output illumination area. The recycling cavity also includes a component that provides the cavity with a balance of specular and diffuse characteristics so as to balance cavity efficiency and brightness uniformity over the output area. The component can be characterized by a transport ratio of greater than 15% for a 15 degree incidence angle, and less than 95% for a 45 degree incidence angle.

US 9028108 - Collimating light injectors for edge-lit backlights (2015-05-12)



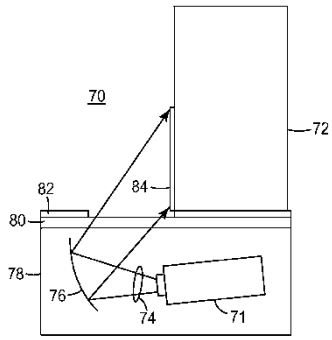
Illumination devices whose function are to inject light into backlights, particularly into backlights that incorporate a recycling cavity formed by a front (50) and back (52) reflector, are described. In some embodiments, the device includes a light source (59) disposed proximate the back reflector, and first (42) and second (44) reflecting structures. The first reflecting structure includes an inner reflective surface (41b) at least a portion of which is inclined to form a wedge with the back reflector. The wedge partially collimates and directs light from the light source generally away from the recycling cavity. The second reflecting structure receives light exiting the wedge and redirects such light into an injection beam directed into the recycling cavity.

US 8926159 - Thin hollow backlights with beneficial design characteristics (2015-01-06)



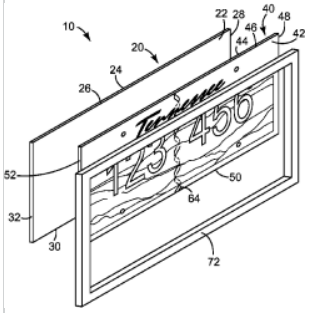
A front and back reflector are arranged to form a hollow light recycling cavity having an output region, and one or more light sources (e.g. LEDs) are disposed to emit light into the cavity. In one aspect, the back reflector has a design characterized by a first and second parameter. The first design parameter is a ratio of the collective emitting area of the light sources Aemit to the area of the output region Aout, and Aemit/Aout is preferably from 0.0001 to 0.1. The second design parameter is SEP/H, where H is the depth of the recycling cavity, and SEP is an average plan view source separation associated with the light sources. Other aspects of the disclosed extended area light sources are also described.

US 8919969 - On-product projection for digital merchandizing (2014-12-30)



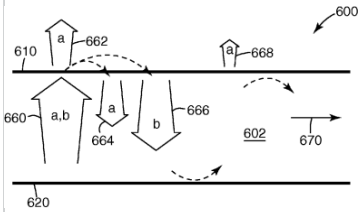
A system for on-product projection and display of electronic content. The system includes a projector for projecting electronic content, a mirror film stack having a reflective surface facing the projector, and a product having an exterior surface facing the reflective surface of the mirror film stack. A graphic is located on a surface of the mirror film stack opposite the reflective surface. The electronic content from the projector is projected onto the exterior surface of the product via the reflective surface of the mirror film stack. The graphic can be located on a display window and hide the mirror from a viewer without completely blocking a view of the projected electronic content. The product can include a removable projection screen for displaying the electronic content, and the projection screen can include a removable label on its non-viewer side to advertise or promote the product.

US 8865293 - Optically active materials and articles and systems in which they may be used (2014-10-21)



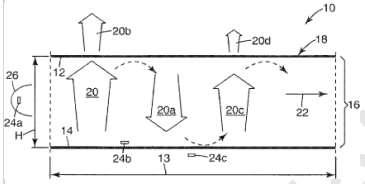
The inventors of the present application developed novel optically active materials, methods, and articles. One embodiment of the present application is an optically active article, comprising: an infrared-reflecting material positioned adjacent to an optically active substrate such that the infrared-reflecting material forms a pattern that can be read by an infrared sensor when the optically active substrate is illuminated by an infrared light source. Another embodiment of the present application relates to a method of manufacturing an optically active article, comprising: obtaining an optically active sheeting; and positioning an infrared- reflecting material on the optically active sheeting to form a pattern. The optically active article may be, for example, a license plate.

US 8740442 - Backlight and display system using same (2014-06-03)



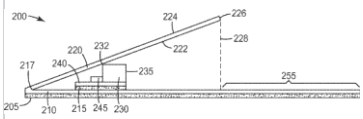
A backlight that includes a front reflector and a back reflector that form a hollow light recycling cavity including an output surface is disclosed. The backlight further includes one or more light sources disposed to emit light into the light recycling cavity. The front reflector includes an on-axis average reflectivity of at least 90% for visible light polarized in a first plane, and an on-axis average reflectivity of at least 25% but less than 90% for visible light polarized in a second plane perpendicular to the first plane.

US 8608363 - Recycling backlights with semi-specular components (2013-12-17)



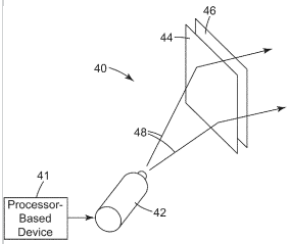
A hollow light-recycling backlight has a "semi-specular" component providing a balance of specularly and diffusely reflected light improving the uniformity of the light output. The component may be arranged on the reflectors (1021), (1014) or inside the cavity (1016). This balance is achieved by designing the component's "transport ratio" defined by (F-B)/(F+B), (F and B are the amounts of incident light scattered forwards and backwards respectively by the component in the plane of the cavity) to lie in a certain range. Furthermore, the product of the front and back reflector "hemispherical" reflectivities should also lie in a given range. Alternatively, the "cavity transport value", a measure of how well the cavity can spread injected light from the injection point to distant points in the cavity should lie in a further range and the "hemispherical" reflectivity of the back reflector should be >0.7.

Collimating light engine



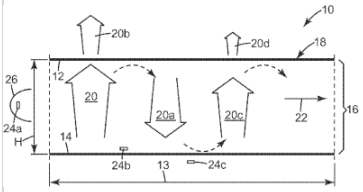
Collimating light engines, methods of making collimating light engines, and articles incorporating collimating light engines are disclosed. In one aspect, a light source and circuitry can be disposed between a reflector and a reflective baffle to form a collimating light engine. The light source is at least partially obscured from view by the reflective baffle. Light emitted from the light source is partially collimated upon leaving the light engine. Light uniformity of the output surface of a backlight can be proved by disposing an array of the collimating light engines in the backlight.

US 8599483 - High angle rear projection system (2013-12-03)



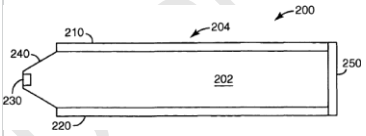
A system for projecting content at an angle to a rear projection screen. The system includes a projector configured for projecting changeable electronic content and a rear projection screen for receiving the projected content at an angle and displaying the projected content.
The rear projection screen includes a turning film having prisms facing toward or away from the projector. For prisms facing toward the projector, a protective film covers the turning film. When the projected content is displayed on the rear projection screen, the content has a substantially uniform appearance.

US 8523419 - Thin hollow backlights with beneficial design characteristics (2013-09-03)



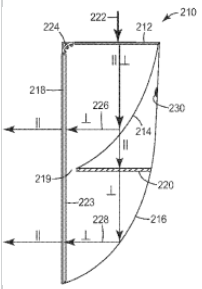
An edge-lit backlight comprises a front and back reflector forming a hollow light recycling cavity having a cavity depth H and an output region of area Aout, and one or more light sources disposed proximate a periphery of the backlight to emit light into the light recycling cavity. The light sources have an average plan view source separation of SEP collectively having an active emitting area Aemit, wherein a first parameter equals Aemit/Aout and a second parameter equals SEP/H. The first parameter is in a range from 0.0001 to 0.1, and by the second parameter is in a range from 3 to 10. The front reflector has a hemispherical reflectivity for unpolarized visible light of R.sup.f.sub.hemi, and the back reflector has a hemispherical reflectivity for unpolarized visible light of R.sup.b.sub.hemi, and R.sup.f.sub.hemi*R.sup.b.sub.hemi is at least 0.70.

US 8469575 - Backlight and display system using same (2013-06-25)



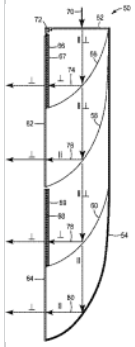
A backlight that includes a front reflector and a back reflector that form a hollow light recycling cavity including an output surface is disclosed. The backlight further includes one or more light sources disposed to emit light into the light recycling cavity. The front reflector includes an on-axis average reflectivity of at least 90% for visible light polarized in a first plane, and an on-axis average reflectivity of at least 25% but less than 90% for visible light polarized in a second plane perpendicular to the first plane.

US 8384852 - Hybrid daylight-coupled backlights for sunlight viewable displays (2013-02-26)



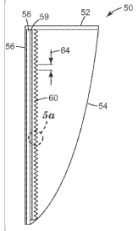
A daylight-coupled display includes a plurality of passive backlights cascaded in a stack for backlighting of LCD panels or static display panels. The display includes a diffuser to transmit light to multiple cascaded curved reflectors, each of which reflects light for backlighting of the display. A polarization rotator is located within the backlight such that the reflectors provide the correct polarization of light to the LCD panel for backlighting of it. One daylight-coupled display can include an active light source to provide light to the reflectors A secondary light source can provide light to at least one of the reflectors to provide backlighting of the display in low lighting conditions.

US 8339542 - Passive and hybrid daylight-coupled N-stack and collapsible backlights for sunlight viewable displays (2012-12-25)



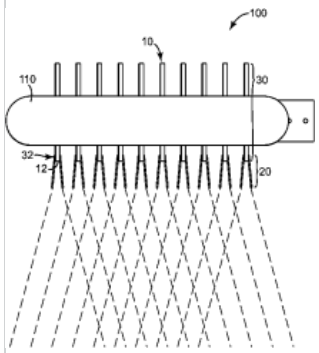
A passive daylight-coupled display having an LCD panel, a diffuser, and a curved reflector behind the LCD panel. For passive backlighting, the diffuser transmits daylight to the reflector, which reflects the daylight to the LCD panel and provides for substantially uniform distribution of the daylight on the LCD panel for backlighting it. An N-stack daylight-coupled display includes a plurality of passive backlights cascaded in a stack for backlighting of LCD panels or static display panels. One N-stack display can include an active light source to provide light to the reflectors, and a secondary light source to provide light to at least one of the reflectors to provide backlighting of the display in low lighting conditions. A collapsible daylight-coupled display includes a daylight-coupled backlight that is collapsible when not in use for hand-held or portable display devices.

US 8228463 - Passive daylight-coupled backlight with turning film having prisms with chaos for sunlight viewable displays (2012-07-24)



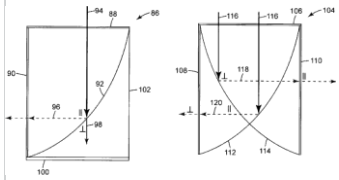
A passive daylight-coupled display having an LCD panel, a diffuser, a turning film behind the LCD panel, and a curved reflector behind the turning film. For passive backlighting, the diffuser transmits daylight to the reflector, which reflects the daylight to the LCD panel through the turning film and provides for substantially uniform distribution of the daylight on the LCD panel for backlighting it. The turning film has prisms with chaos for an improved viewer experience.

US 8192048 - Lighting assemblies and systems (2012-06-05)



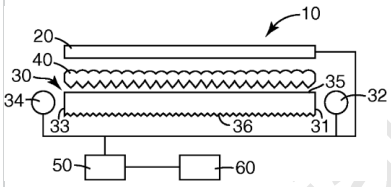
The present disclosure relates to illumination or lighting assemblies and systems that provide illumination using LEDs. In one aspect, the present disclosure provides a lighting assembly, comprising: multiple light emitting diodes that emit light; an optical system that directs the light emitted by the light emitting diodes, the optical system positioned adjacent to light emitting diodes; and a cooling fin including a two-phase cooling system, the cooling fin positioned adjacent to the light emitting diodes such that the two-phase cooling system removes heat from the light emitting diodes. In another aspect, the present disclosure provides a lighting system including multiple lighting assemblies. The lighting assemblies and systems of the present disclosure can be used in, for example, a street light, a backlight (including, for example, a sun-coupled backlight), a wall wash light, a billboard light, a parking ramp light, a high bay light, a parking lot light, a signage lit sign (also referred to as an electric sign), static signage (including, for example, sun-coupled static signage), illuminated signage, and other lighting applications.

US 8149351 - Passive and hybrid daylight-coupled backlights for sunlight viewable displays (2012-04-03)



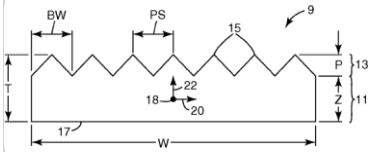
A passive daylight-coupled display having an LCD panel, a diffuser, and a curved reflector behind the LCD panel. For passive backlighting, the diffuser transmits daylight to the reflector, which reflects the daylight to the LCD panel and provides for substantially uniform distribution of the daylight on the LCD panel for backlighting it. A hybrid display includes both a passive backlight and an active backlight for providing backlighting from an active light source.

US 8068187 - Stereoscopic 3D liquid crystal display apparatus having a double sided prism film comprising cylindrical lenses and non-contiguous prisms (2011-11-29)



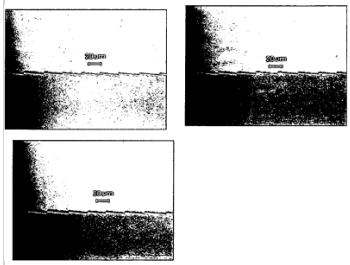
A stereoscopic 3D liquid crystal display module includes a liquid crystal display panel and a directional backlight positioned to provide light to the liquid crystal display panel. A double sided prism film is disposed between the liquid crystal display panel and the directional backlight. The prism film includes a first surface having a series of cylindrical lenses adjacent the liquid crystal display panel and a second surface, opposite the first surface, having a series of non-contiguous prisms adjacent the directional backlight. Each of the non-contiguous prisms is separated from adjacent prisms by a transmissive flat portion or an opaque portion.

US 7843637 - Birefringent structured film for LED color mixing in a backlight (2010-11-30)



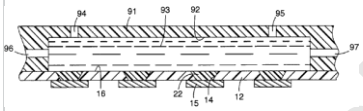
An article for use in light spreading includes a body having first and second surfaces, and first and second in-plane axes that are orthogonal with respect to each other and a third axis that is mutually orthogonal to the first and second in-plane axes in a thickness direction of the body. A portion of the first surface is a birefringent structured surface. The portion is structured such that, when the article receives a light signal within a particular range of wavelengths, the structured surface causes splitting the light signal into a plurality of divergent light signals. The article can be used for color mixing such as in a cavity providing a backlight for LCD devices or other display devices requiring a backlight.

US 7418202 - Article having a birefringent surface and microstructured features having a variable pitch or angles for use as a blur filter (2008-08-26)



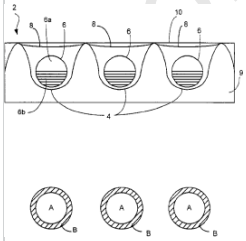
An article for use in light spreading includes a body having first and second surfaces, and first and second in-plane axes that are orthogonal with respect to each other and a third axis that is mutually orthogonal to the first and second in-plane axes in a thickness direction of the body. A portion of the first surface is a birefringent structured surface. The portion is structured such that, when the article receives a light signal within a particular range of wavelengths, the structured surface causes splitting the light signal into a plurality of divergent light signals. The article can be used for color mixing such as in a cavity providing a backlight for LCD devices or other display devices requiring a backlight.

US 7220344 - Film based addressable programmable electronic matrix articles and methods of manufacturing and using the same (2007-05-22)



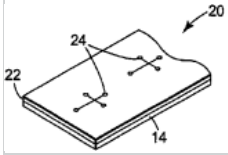
An electronic device adapted for performing molecular biological processes. The device includes a flexible polymeric substrate having a first surface and a second surface. A plurality of microlocations interrupt the first surface, and each of said microlocations include an electrode disposed on the second surface of the flexible substrate. A hydrophilic matrix is positioned on the first surface of the flexible substrate and is capable of electrical contact with the electrode.

US 7057599 - Microstructures with assisting optical lenses (2006-06-06)



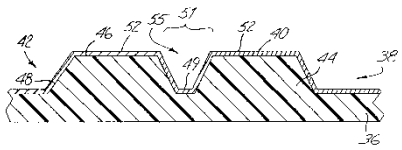
A microstructure to interact with electromagnetic waves by changing optical aspect in selected areas in response to an external signal, the microstructure comprising: a plurality of responsive elements, each responsive element capable of presenting at least two different optical aspects and changing between the optical aspects based on an applied external signal; a support substrate containing the responsive elements; and a plurality of assisting optical lenses each optically enlarging an image from the responsive elements associated with the assisting optical lens.

US 6761962 - Microfluidic articles (2004-07-13)



The present invention provides various microfluid processing architecture-bearing, polymeric articles. The articles may include microelectronic, microoptical or microchemical elements. The article also may include inorganic thin film coatings.

US 6700695 - Microstructured segmented electrode film for electronic displays (2004-03-02)

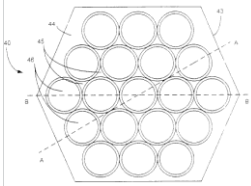


The display panel comprises surrounding media containing particles which are responsive to changes in a magnetic field are optically anisotropic toward the viewing surface. The electrode film has an array layer and an electrode layer, where the array layer provides a support structure for the electrode layer and electrically non conductive and in contact with the surface of the display panel and having. a plurality of mesa shaped segments where each mesa shaped segment has a top face and side walls extending downward from the top face. The electrode layer formed of an electrically conductive material coats the array layer and is exposed for contact by an electrical stimulus. The electrode layer is thicker on the top face than on the side walls, producing resistive bridges between adjacent top faces. The resistive bridges partially electrically isolate each electrode from the other electrodes in the electrode layer.

US 6664318 - Encapsulant compositions with thermal shock resistance (2003-12-16)

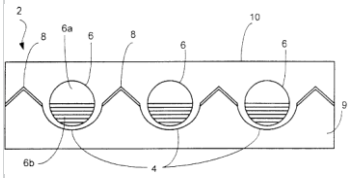
A thermomechanical-shock-resistant cured composition for solventless, hydrophobic resin encapsulation of electronic components having a glass transition temperature below 0° C. and containing a non-silicone oligomer including a flexible hydrocarbon backbone with reactive functionality, up to about 40% by weight of an adhesion promoter, and a optional viscosity-modifying component.

US 6577432 - Post and pocket microstructures containing moveable particles having optical effects (2003-06-10)



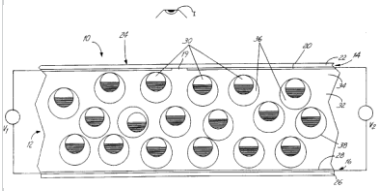
A microfabricated structure to interact with electromagnetic waves, such as a visual display apparatus for positioning movable particles, the structure comprising a substrate containing a plurality of pockets and/or a plurality of posts, and a plurality of optically anisotropic particles placed in the substrate. Pockets are sealable in relation to other pockets and to air, and each pocket being capable of positioning at least one particle.

US 6570700 - Microstructures with assisting optical elements to enhance an optical effect (2003-05-27)



A microstructure to interact with electromagnetic waves by changing optical aspect in selected areas in response to an external signal, the microstructure comprising: a plurality of responsive elements, each responsive element capable of presenting at least two different optical aspects and changing between the optical aspects based on an applied external signal; and a support substrate containing the responsive elements, wherein at least a part of the support substrate defines an optical structure containing a plurality of assisting optical elements each optically enlarging an image from the responsive elements associated with the assisting optical element.

US 6480322 - Method of improving the respondability of moveable structures in a display (2002-11-12)

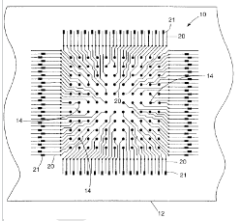


A method improves the respondability of moveable structures in a display medium, such as a gyricon display. The inventive method includes heating the display and exercising the rotatable structures within the display by an application of an electrical field. Applying heat to the display enlarges the cavity surrounding each particle due to thermal expansion of the cavity and the bead rotation cycling jostles the particles loose. The inventive method enables a larger percentage of the particles to rotate to a greater degree thereby improving resolution of an image. Alternatively, heating and exercising can be accomplished by application of ultrasonics. In addition, degassing the fluid contained in the display enhances switching with heat and improves the rotatability of the structures.

US 6462859 - Electromagnetically responsive particle assembly and methods and articles for manufacture and use (2002-10-08)

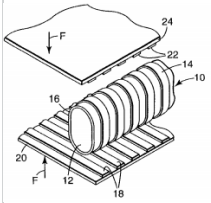
Assemblies containing a substrate with pockets for electromagnetically responsive particles can be made for a variety of uses, including, for example, display media, lenses, and color- changing fabric. The arrangement of these pockets can be selected to provide higher particle density than previously realized. The assembly includes an assembly substrate, particles, and a top coat layer.

US 6451191 - Film based addressable programmable electronic matrix articles and methods of manufacturing and using the same (2002-09-17)



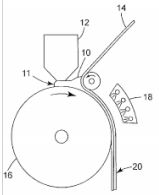
An electronic device adapted for performing molecular biological processes. The device includes a flexible polymeric substrate having a first surface and a second surface. A plurality of microlocations interrupt the first surface, and each of said microlocations include an electrode disposed on the second surface of the flexible substrate. A hydrophilic matrix is positioned on the first surface of the flexible substrate and is capable of electrical contact with the electrode.

US 6403226 - Electronic assemblies with elastomeric members made from cured, room temperature curable silicone compositions having improved stress relaxation resistance (2002-06-11)



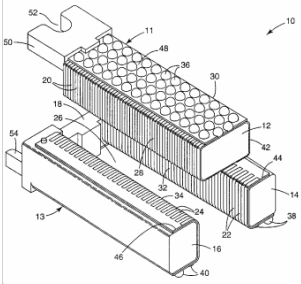
The present invention relates to electronic assemblies which include an elastomeric member made of a cured, room-temperature curable polysiloxane composition.When the assemblies are used to electrically interconnect a first contacting site on a first electronic device to a second contacting site on a second electronic device, the stress-relaxation resistant properties of the elastomer enhance local contact force to maintain a reliable connection.

US 6375871 - Methods of manufacturing microfluidic articles (2002-04-23)



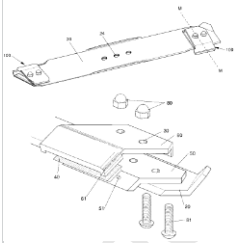
A process for preparing a molded article that includes: (a) bringing a moldable material and an open molding tool comprising a molding surface into line contact with each other to imprint a microfluid processing architecture pattern onto the moldable material and thereby form a molded article; and (b) separating the molded article from said molding surface. The invention also features various microfluid processing architecture-bearing, polymeric articles.

US 5876215 - Separable electrical connector assembly having a planar array of conductive protrusions (1999-03-02)



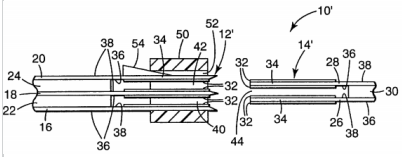
A separable electrical connector assembly includes at least one connector body having a planar array of conductive protrusions. The conductive protrusions can be metallurgically bonded or pressure engaged with conductive contact pads on a surface of a printed circuit substrate, such as a printed circuit board or a flex circuit. In addition, a variety of decoupling means can be incorporated to substantially decouple the metallurgical bonds or pressure engagements from stresses produced by use of the separable electrical connector assembly and differential thermal expansion between the connector body and the printed circuit substrate.

US 5839263 - Lawnmower blade with replaceable knives (1998-11-24)



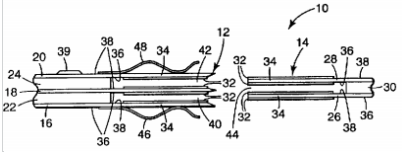
A lawnmower blade with replaceable knife members (40) mounted on the leading edge of a rotating blade body wherein the entire assembly to a rotating shaft of a lawnmower or the like. The knife member (40) is manufactured from carbides, high speed steels, or powder metals, thus producing a cutting edge with high quality and durability. Knife member is attached to a rotating body in either a safety cage assembly (100) or embedded in the body of the blade. The knife member is retained on the blade body and can be rotated to a fresh sharp edge or replaced.

US 5827084 - Electrical connector assembly with interleaved multilayer structure and fabrication method (1998-10-27)



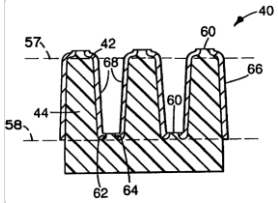
An electrical connector assembly having an interleaved multilayer structure includes a first connector structure having at least a first connector layer, and a second connector structure having at least second and third connector layers. A plurality of conductive contact surfaces are disposed along edge portions of the connector layers. Upon engagement of the first connector structure and the second connector structure, the first connector layer is oriented to engage a gap defined between the second and third connector layers. The interleaved engagement of the connector layers results in an low-profile electrical connector assembly providing a large number of interconnections between respectively aligned contact surfaces with precise alignment and reliable electrical contact. The connector layers may include conductive contact surfaces on one or both sides of each layer to provide higher interconnection densities. The disposition of contact surfaces on both sides of a layer can relax alignment tolerances for a given interconnection density. Nevertheless, precise alignment can be ensured by the use of conventional lithographic techniques to print the contact surfaces. At least some of the connector layers can be made from a material capable of resilient deformation, and can be realized, for example, by flexible printed circuit board layers or flex circuit layers. The resiliently deformable material, when deformed, produces a force that resists deformation. Thus, when interleaved engagement of the connector layers produces deformation, the resisting force serves to bias the connector layers against one another to ensure good electrical contact force.

US 5741148 - Electrical connector assembly with interleaved multilayer structure and fabrication method (1998-04-21)



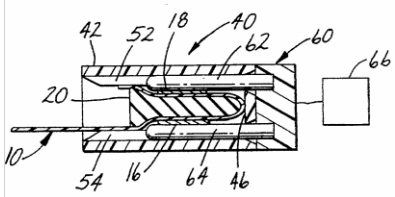
An electrical connector assembly having an interleaved multilayer structure includes a first connector structure having at least a first connector layer, and a second connector structure having at least second and third connector layers. A plurality of conductive contact surfaces are disposed along edge portions of the connector layers. Upon engagement of the first connector structure and the second connector structure, the first connector layer is oriented to engage a gap defined between the second and third connector layers. The interleaved engagement of the connector layers results in an low-profile electrical connector assembly providing a large number of interconnections between respectively aligned contact surfaces with precise alignment and reliable electrical contact. The connector layers may include conductive contact surfaces on one or both sides of each layer to provide higher interconnection densities. The disposition of contact surfaces on both sides of a layer can relax alignment tolerances for a given interconnection density. Nevertheless, precise alignment can be ensured by the use of conventional lithographic techniques to print the contact surfaces. At least some of the connector layers can be made from a material capable of resilient deformation, and can be realized, for example, by flexible printed circuit board layers or flex circuit layers. The resiliently deformable material, when deformed, produces a force that resists deformation. Thus, when interleaved engagement of the connector layers produces deformation, the resisting force serves to bias the connector layers against one another to ensure good electrical contact force.

US 5736191 - Microridge abrasion for selective metalization (1998-04-07)



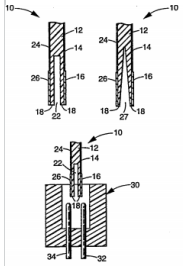
A process for selective metalization for electrically isolating areas of a substrate is disclosed. The process employs placing microridges onto a surface, the microridge protruding from the plane formed by the surface. The surface, including the microridge, is then metalized and a portion of the metalized microridge, beyond the surface plane is removed. This removal process creates electrically isolated areas without affecting the integrity of the substrate.

US 5433632 - Flexible circuit connector (1995-07-18)



A flexible circuit connector for electrically connecting two electronic devices. The connector includes a flexible circuit sheet having electrically conductive traces which lead from a first electronic device, such as a memory chip, to two arrays of electrically conductive pads. The connector includes a connector housing having two spaced, substantially parallel side walls connected by a front wall having a row of holes adjacent each of the side walls to receive two rows of conductive pins which are connected to a second electronic device, such as a printed circuit board. A unitary, locally deformable, biasing member is positioned within the connector housing and between the two array of conductive pads. The biasing member forces the two arrays of pads into electrical contact with the two rows of pins when the pins are inserted into the holes in the front wall of the connector housing.

US 5345364 - Edge-connecting printed circuit board (1994-09-06)



A printed circuit board capable of resilient deformation having two major surfaces and a contact edge. Electrically conductive traces are provided on each major surface of the board which lead to electrically conductive contact pads at the contact edge of the board. A gap is provided between the two major surfaces of the board along the contact edge. The gap permits resilient deformation of the board so that a force is created upon deformation which will bias the major surfaces toward their undeformed position. An elastomeric biasing member may be provided in the gap.