G02F

DEVICES OR ARRANGEMENTS, THE OPTICAL OPERATION OF WHICH IS MODIFIED BY CHANGING THE OPTICAL PROPERTIES OF THE MEDIUM OF THE DEVICES OR ARRANGEMENTS FOR THE CONTROL OF THE INTENSITY, COLOUR, PHASE, POLARISATION OR DIRECTION OF LIGHT, e.g. SWITCHING, GATING, MODULATING OR DEMODULATING; TECHNIQUES OR PROCEDURES FOR THE OPERATION THEREOF; FREQUENCY-CHANGING; NON-LINEAR OPTICS; OPTICAL LOGIC ELEMENTS; OPTICAL ANALOGUE/DIGITAL CONVERTERS (optical transfer means between sensing member and indicating or recording part in connection with measuring G01D 5/26; devices in which mathematical operations are carried out with optical elements G06E 3/00, {G06E 3/001}; electrical signal transmission systems using optical means to convert the input signal G08C 19/36; information-recording by electric or magnetic means and reproducing by sensing optical properties G11B 11/00; static stores using optical elements G11C 13/04; transmission systems employing electromagnetic waves other than radio waves, e.g. light, infra-red radiation, H04B 10/00; optical multiplex systems H04J 14/00; pictorial communication, e.g. television H04N)

WARNING
The following IPC group is not used in the CPC scheme.
Subject matter covered by these groups is classified in the following CPC groups:
G02F 1/13357 covered by G02F 1/1336 and subgroups

1/00 Devices or arrangements for the control of the intensity, colour, phase, polarisation or direction of light arriving from an independent light source, e.g. switching, gating, or modulating:
Non-linear optics (thermometers using change of colour or translucency G01K 11/12; using changes in fluorescence G01K 11/72; light guide devices G02B 6/00; optical devices or arrangements using movable or deformable elements for controlling light independent of the light source G02B 26/00; control of light in general G05D 25/00; visible signalling systems G08B 5/00; indicating arrangements for variable information by selection or combination of individual elements G09F 9/00; control arrangements or circuits for visual indicators other than cathode-ray tubes G09G 3/00; control of light sources H01S 3/10; H05B 33/00; H05B 35/00 - H05B 43/00; {photochromic filters G02B 5/23; optical logic elements G02F 3/00})

NOTE
This group covers only:
– devices or arrangements, e.g. cells, the optical operation of which is modified by changing the optical properties of the medium of the devices or arrangements by the influence or control of physical parameters, e.g. electric fields, electric current, magnetic fields, sound or mechanical vibrations, stress or thermal effects;
– devices or arrangements in which the electric or magnetic field component of the light beams influences the optical properties of the medium, i.e. non-linear optics;
– control of light by electromagnetic waves, e.g. radio waves, or by electrons or other elementary particles.

1/0009 . {Materials therefor}

NOTE
G02F 1/0009 and subgroups contain mostly non-patent literature

1/0018 . . {Electro-optical materials}
1/0027 . . . {with ferro-electric properties (domain inversion in ferro-electric materials G02F 1/3558; ferro-electric materials in general H01G 7/02)}
1/0036 . . {Magneto-optical materials (magnetic materials in general H01E)}
G02F

1/0045 ... (Liquid crystals as far as the physical properties are concerned (chemical composition and properties of liquid crystals C09K 19/00)

1/0054 ... (Structure, phase transitions, NMR, ESR, Moessbauer spectra)

1/0063 ... (Optical properties, e.g. absorption, reflection, non-linear effects, birefringence (non linear optics in general G02F 1/23))

1/0072 ... (Mechanical, acoustic, electro-elastic, magneto-elastic properties)

1/0081 ... (Electric or magnetic properties)

1/009 ... (Thermal properties (thermometers using change of colour or translucency G01K 11/12; radiation pyroometry G01J 5/00)

1/01 ... for the control of the intensity, phase, polarisation or colour (G02F 1/29; G02F 1/35 take precedence; polarising elements per se G02B 5/30; static storage per se G11C; image tube screens acting as light valves by shutter operation H01J 29/12; such screens acting by discoloration H01J 29/14; projection arrangements for television image reproduction, e.g. using eidophor H04N 5/74; recording by light G11B 7/00 - G11B 11/00)

1/0102 ... (Constructional details (G02F 1/1306, G02F 1/133 take precedence))

1/0105 ... (Illumination devices (for liquid crystal cells G02F 1/1357; for display devices for electronic time pieces G04G 9/0041))

1/0107 ... [Gaskets, spacers, sealing of the cell; Filling and closing of the cell (for liquid crystal cells G02F 1/1339, G02F 1/1341; for electrochromic or electrolytic cells G02F 1/161)]

1/011 ... (in optical waveguides (G02F 1/0134, G02F 1/0178, G02F 1/025, G02F 1/035, G02F 1/0508, G02F 1/0553, G02F 1/065, G02F 1/073, G02F 1/095, G02F 1/125, G02F 1/1326, G02F 1/225 take precedence; optical waveguides in general G02B 6/00)]

2001/0113 ... (in optical fibres)

1/0115 ... (by controlling the evanescent coupling of light from a fibre into an active, e.g. electro-optic, overlay)

1/0118 ... (Operation of the device; Circuit arrangements not otherwise provided for (G02F 1/0327, G02F 1/0516, G02F 1/076, G02F 1/092, G02F 1/113, G02F 1/1306, G02F 1/163 take precedence))

1/0123 ... (Circuits for the control or stabilisation of the bias voltage, e.g. automatic bias control [ABC] feedback loops)

1/0126 ... (by another light beam, i.e. opto-optical modulation (G02F 1/01716, G02F 1/0338, G02F 1/0533, G02F 1/0541, G02F 1/0558, G02F 1/135, G02F 1/292 take precedence))

1/0128 ... (based on electro-mechanical, magneto-mechanical, elasto-optic effects)

1/0131 ... (based on elasto-optic; i.e photoelastic effect, e.g. mechanically induced birefringence (acousto-optic devices G02F 1/111)

1/0134 ... (in optical waveguides)

1/0136 ... (for the control of polarisation, e.g. state of polarisation [SOP] control, polarisation scrambling, TE-TM mode conversion or separation (G02F 1/0353 takes precedence)

2001/0139 ... (Polarisation scrambling; Depolarisers)

2001/0142 ... (TE-TM mode conversion)

2001/0144 ... (TE-TM mode separation)

1/0147 ... (based on thermo-optic effects (G02F 1/132 takes precedence; tenebrescent compositions C09K 9/00; radiation pyrometry G01J 5/00; thermometers using change of colour or translucency G01K 11/12)

1/015 ... based on semiconductor elements with at least one potential jump barrier, e.g. PN, PIN junction (G02F 1/03 takes precedence)

2001/0151 ... (modulating the refractive index)

2001/0152 ... (by free carrier effects (Plasma))

2001/0153 ... (by electro-refraction (Kramers-Kronig relation))

2001/0154 ... (by electro-optic effects (LEO=Pockels, QEO=Kerr))

2001/0155 ... (modulating the optical absorption)

2001/0156 ... (by free carrier absorption)

2001/0157 ... (by electro-absorption effects (FK, Stark, QCSE))

2001/0158 ... (with blue-shift of the absorption band)

2001/0159 ... (with red-shift of the absorption band)

1/017 ... Structures with periodic or quasi periodic potential variation, e.g. superlattices, quantum wells

1/01708 ... (in an optical waveguide structure)

1/01716 ... (Optically controlled superlattice or quantum well devices)

1/01725 ... (with a non-rectangular quantum well structure, e.g. coupled, graded, stepped quantum wells)

2001/01733 ... (Coupled or double quantum wells)

2001/01741 ... (Asymmetrically coupled or double quantum wells)

2001/0175 ... (with a spatially varied well profile, e.g. graded, stepped quantum wells)

2001/01758 ... (with an asymmetric well profile, e.g. asymmetrically stepped quantum wells)

2001/01766 ... (Strained superlattice or quantum well devices)

2001/01775 ... (involving an intersubband transition in one well, e.g. e1->e2)

2001/01783 ... (Quantum wire)

2001/01791 ... (Quantum box or dot)

1/025 ... in an optical waveguide structure (G02F 1/017, G02F 1/2257 take precedence)

1/03 ... based on ceramics or electro-optical crystals, e.g. exhibiting Pockels effect or Kerr effect (G02F 1/061 takes precedence)

1/0305 ... (Constructional arrangements (G02F 1/0327 - G02F 1/03 take precedence))

1/0311 ... (Structural association of optical elements, e.g. lenses, polarizers, phase plates, with the crystal)

1/0316 ... (Electrodes)

1/0322 ... (Arrangements comprising two or more independently controlled crystals)

1/0327 ... (Operation of the cell; Circuit arrangements (G02F 1/05 takes precedence))
exhibiting Faraday effect based on magneto-optical elements, e.g. based on electro-optical liquids exhibiting Kerr
(G02F 1/07)

1/11 . . . [based on acousto-optical elements, e.g. using variable diffraction by sound or like mechanical waves ({elasto-optic effect without wave propagation G02F 1/0131; } acousto-optical deflection G02F 1/33)]

1/125 . . . in an optical waveguide structure

1/13 . . . based on liquid crystals, e.g. single liquid crystal display cells (liquid crystal materials G09K 19/00)

1/1303 . . . [Apparatus specially adapted to the manufacture of LCDs]

1/1306 . . . [Details (not used, see sub-groups)]

1/1309 . . . [Repairing; Testing (testing of optical apparatus G01M 11/00; electronic testing of displays or display drivers, e.g. of LCDs, G09G 3/006)]

1/1313 . . . (specially adapted for a particular application)

2001/1316 . . . [Cleaning methods or materials for cleaning part of liquid crystal cell components during the manufacturing process]

1/132 . . . [Thermal activation of liquid crystals exhibiting a thermo-optic effect (thermometers using change of colour or translucency of liquid crystals G01K 11/165; thermally addressed liquid crystal elements in a matrix G09G 3/3603)]

1/1323 . . . [Arrangements for providing a switchable viewing angle]

1/1326 . . . [Liquid crystal optical waveguides or liquid crystal cells specially adapted for gaging or modulating between optical waveguides]

1/133 . . . [Constructional arrangements; Operation of liquid crystal cells; Circuit arrangements (arrangements or circuits for control of liquid crystal elements in a {segment display or a} matrix, not structurally associated with these elements, {respectively G09G 3/18 and } G09G 3/36)]

1/13306 . . . [Circuit arrangements or driving methods for the control of single liquid crystal cells (G02F 1/132; G02F 1/13382 take precedence)]

2001/13312 . . . [Circuits comprising a photodetector not for feedback]

1/13318 . . . [Circuits comprising a photodetector]

2001/13324 . . . [Circuits comprising a solar cell]

1/1333 . . . [Constructional arrangements; {Manufacturing methods} (G02F 1/135; G02F 1/136 take precedence)]

2001/133302 . . . [rigid substrate, e.g. inorganic]

1/133305 . . . [Flexible substrates, e.g. plastics, organic film]
[LCD panel immediate support structure, e.g. front and back frame or bezel]

[Environmental protection, e.g. dust, humidity]

[Back frame]

[Intermediate frame, e.g. between backlight housing and front frame]

[Front frame]

[Method of assembling (G02F 2201/465 takes precedence)]

[Segments frame]

[Cover glass]

[Electromagnetic shield]

[Ion-diffusion preventing or absorbing layer]

[Plasma addressed liquid crystal cells [PACL] (plasma panels H01J 17/49)]

[for double side displays]

[Insulating layers (G02F 1/135, G02F 1/137, G02F 1/135, G02F 1/136 take precedence)]

[Charged-particles, e.g. electron-beam, addressed liquid crystals cells (screen for cathode ray tubes acting as light valves H01J 29/12; electrography, electrophotography G03G)]

[Manufacturing of individual cells out of a plurality of cells, e.g. by dicing]

[Arrangements for aligning or assembling the substrates]

[Planarisation layer]

[Combining plural substrates to produce large-area displays, e.g. tiled displays]

[Optically addressed liquid crystal cells (G02F 1/135 takes precedence)]

[Cells in which the active layer comprises a liquid crystalline polymer (liquid crystalline polymers in general C09K 19/36)]

[cell having two substrates with different characteristic, e.g. thickness or material]

[Cells with varying thickness of the liquid crystal layer]

[for displaying permanent signs or marks]

[Cells with plural compartments or having plurality of liquid crystal microcells partitioned by walls, e.g. one microcell per pixel]

[Input devices, e.g. touch-panels (specially adapted as input devices to computers G06F 3/033; touch-panels per se G06K 11/06, keyboard switches per se H01H 13/70)]

[Heating or cooling of liquid crystal cells other than for activation, e.g. circuits or arrangements for temperature control, stabilisation or uniform distribution over the cell]

[with cooling means, e.g. fans]

[Constructional difference between the display region and the peripheral region]
G02F

[inside the LC element, i.e. between the cell substrates]

[on the back side]

[Illuminating devices (in general F21V, associated with display devices for electronic watches G04G 9/0041)]

[for spatial active dimming]

[Direct backlight]

[with LEDs]

[with lamps]

[including specially adapted reflectors]

[including a specially adapted diffusing, scattering or light controlling members]

[the light controlling member including light directing or refracting elements, e.g. prisms or lenses]

[including particular frames or supporting means]

[including means for improving the color mixing, e.g. white]

[including means for improving the brightness uniformity]

[Electrical details]

[including a particular sequence of light sources]

[the light is generated by photoluminescence, e.g. a phosphor is illuminated by UV or blue light]

[Edge-illuminating devices, i.e. illuminating from the side (G02B 6/0001 takes precedence)]

[Front illuminating devices]

[Illumination with ultra-violet light; Luminous elements or materials associated to the cell]

[for ambient light]

[providing polarised light, e.g. by converting a polarisation component into another one (optical systems for polarising G02B 27/28)]

[providing coloured light (G02F 1/133617, G02F 1/133533 take precedence)]

[colour sequential illumination]

[Inclined coloured light beams]

[having a particular spectral emission]

[Electron stream lamps]

[providing two modes of illumination, e.g. day-night]

[Projection-direct viewing]

[with cooling means]

[Binrefringent elements, e.g. for optical compensation]

[with a spatial distribution of the retardation value]

[with refractive index ellipsoid inclined relative to the LC-layer surface]

[using mesogenic materials]

[the refractive index Nz perpendicular to the element surface being different from in-plane refractive indices Nx and Ny, e.g. biaxial or with normal optical axis]

[Multi-functional compensators]

[with twisted orientation, e.g. comprising helically oriented LC-molecules or a plurality of twisted birefringent sublayers]

[characterized by the wavelength dispersion]

[Waveplates, i.e. plates with a retardation value of lambda/n]

[Surface-induced orientation of the liquid crystal molecules, e.g. by alignment layers]

[by introducing organic surfactant additives into the liquid crystal material (C08K 19/56 takes precedence)]

[Structures for producing distorted electric fields, e.g. bumps, protrusions, recesses, slits in pixel electrodes]

[by organic films, e.g. polymeric films]

[by first depositing a monomer]

[with coupling agent molecules, e.g. silane]

[Polyimide, polyamide-Imide]

[made of a mesogenic material]

[Disclination line; Reverse tilt]

[by obliquely evaporated films, e.g. Si or SiO2 films]

[for homogeneous alignment]

[for homeotropic alignment]

[for high pretilt angle, i.e. > 15 degrees]

[for low pretilt angle, i.e. < 15 degrees]

[with different alignment orientations or pretilt angles on a same surface, e.g. for grey scale or improved viewing angle]

[with different alignment orientations]

[with different pretilt angles]

[without a surface treatment]

[comprising an active, e.g. switchable alignment layer]

[The alignment material or treatment is different for the two opposite substrates]

[having structures, i.e. unevenness locally influencing the alignment]

[by treatment of the surface, e.g. embossing, rubbing, light irradiation (G02F 1/133711, G02F 1/133734, G02F 1/133753 take precedence)]

[by etching]

[by light irradiation, e.g. linearly polarised light photo-polymerisation]

[by cooling]

[by etching]

[having conducting property]

[Gaskets; Spacers, also spacers with conducting properties (electric line connectors H01R)]; Sealing of the cell

[spacers dispersed on the cell substrate, e.g. spherical particles, microfibres]
Crystal valves H04N 9/3197

(Reflective electrodes take precedence)

2001/134354

{the sub-pixels being capacitively coupled}

1/134363

{for applying an electric field parallel to the substrate, i.e. in-plane switching [IPS]}

1/134372

{for fringe field switching [FFS]}

where the common electrode is not patterned, e.g. planar

1/134381

{Hybrid switching mode, i.e. for applying an electric field both parallel and orthogonal to the substrates}

1/13439

{characterised by their electrical, optical, physical properties; materials therefor; method of making}

1/1345

{Conductors connecting electrodes to cell terminals}

1/13452

{Conductors connecting driver circuitry and terminals of panels (H01L 21/00 takes precedence; electrical details inside the cell G02F 1/133)}

1/13454

{Drivers integrated on the active matrix substrate (G02F 1/136277 takes precedence)}

2001/13456

{cell terminals on one side of the display only}

1/13458

{Terminal pads}

1/1347

{Arrangement of liquid crystal layers or cells in which the final condition of one light beam is achieved by the addition of the effects of two or more layers or cells (colour projection displays with liquid crystal valves H04N 9/3197)}

1/13471

{in which all the liquid crystal cells or layers remain transparent, e.g. FLC, ECB, DAP, HAN, TN, STN, SBE-LC cells (G02F 1/13475 takes precedence)}

1/13473

{for wavelength filtering or for colour display without the use of colour mosaic filters}

1/13475

{in which at least one liquid crystal cell or layer is doped with a pleochroic dye, e.g. GH-LC cell (G02F 1/13476 takes precedence)}

1/13476

{in which at least one liquid crystal cell or layer assumes a scattering state}

2001/13478

{based on selective reflection}

1/135

{Liquid crystal cells structurally associated with a photoconducting or a ferro-electric layer, the properties of which can be optically or electrically varied}

(G02F 1/13348 takes precedence)

2001/1351

{light-absorbing or blocking layer}

2001/1352

{light-reflecting layer}

2001/1354

{having a particular photoconducting structure or material}

2001/1355

{material or manufacturing process thereof}

2001/1357

{electrode structure}

1/1358

{the supplementary layer being a ferro-electric layer}

1/136

{Liquid crystal cells structurally associated with a semi-conducting layer or substrate, e.g. cells forming part of an integrated circuit (G02F 1/135 takes precedence)}

2001/13606

{having means for reducing parasitic capacitance}

2001/13613

{the semiconductor element is formed on a first substrate and thereafter transferred to the final cell substrate}

1/1362

{Active matrix addressed cells (G02F 1/134336, G02F 1/134363 take precedence)}

1/136204

{Arrangements to prevent high voltage or static electricity failures}

2001/136209

{Light shielding layers, e.g. black matrix, incorporated in the active matrix substrate, e.g. structurally associated with the switching element}

1/136213

{Storage capacitors associated with the pixel electrode}

2001/136218

{Shield electrode}

2001/136222

{Color filter incorporated in the active matrix substrate}

1/136227

{Through-hole connection of the pixel electrode to the active element through an insulation layer}

2001/136231

{for reducing the number of lithographic steps}

2001/136236

{using a gray or half tone lithographic process}

1/13624

{having more than one switching element per pixel}

2001/136245

{having complementary transistors}

2001/13625

{Patterning using a multi-mask exposure}

2001/136254

{Checking; Testing}

1/136259

{Repairing; Defects}

2001/136263

{Line defect}

2001/136268

{Switch defect}

2001/136272

{Auxiliary line}

1/136277

{formed on a semiconductor substrate, e.g. silicon}

2001/136281

{having a transmissive semiconductor substrate}

1/136286

{Wiring, e.g. gate line, drain line}

2001/13629

{Multi-layer wirings}
interaction, dynamic scattering

phase transition, orientation effect, guest-host

magneto-optical effect, e.g. field-induced

characterised by a particular electro-or

liquid crystal remains transparent

{Blue phases}

{Hybrid alignment cells (G02F 1/1393 takes precedence)}

{using smectic liquid crystals (G02F 1/13762 takes precedence)}

{Deformed helix ferroelectric [DHL]}

{based on a change of the texture state of a

cholesteric liquid crystal}

{using guest-host interaction

(G02F 1/13762, G02F 1/13737, take precedence)}

{based on a field-induced phase transition

(G02F 1/13781 takes precedence)}

{in liquid crystals doped with a pleochroic dye}

{based on electrohydrodynamic instabilities or domain formation in liquid crystals}

{using dynamic scattering}

{the liquid crystal selectively assuming

a light-scattering state (G02F 1/1334,

G02F 1/13718 take precedence)}

{containing luminescent or electroluminescent additives (luminescent materials in general C09K 11/00; compositions of liquid crystals comprising additives C09K 19/52 - C09K 19/603; electroluminescent light sources H05B 33/00)}

{based on magneto-optical effects}

{Polymer stabilized liquid crystal layers}

{using smectic liquid crystals (G02F 1/141 takes precedence)}

{Hybrid alignment cells (G02F 1/1393 takes precedence)}

{based on orientation effects in which the liquid crystal remains transparent}

{Bistable or multi-stable liquid crystal cells (G02F 1/141 takes precedence)}

{using a field-induced sign-reversal of the dielectric anisotropy}

{the birefringence of the liquid crystal being electrically controlled, e.g. ECB-, DAP-, HAN-, PI-LC cells (G02F 1/1396, G02F 1/141 take precedence)}

{Optically compensated birefringence [OCB]- cells or PI- cells}

{the liquid crystal being selectively controlled between a twisted state and a non-twisted state, e.g. TN-LC cell (G02F 1/141 takes precedence)}

{the twist being substantially higher than 90°, e.g. STN-, SBE-, OMI-LC cells]}

{the twist being below 90°C}

{Antiferroelectric liquid crystals]

{Deformed helix ferroelectric [DHL]}

{Details of the smectic layer structure, e.g. bookshelf, chevron, C1 and C2}

{using smectic liquid crystals, e.g. based on the electroclinic effect}
G02F

2001/1635 . . . [the pixel comprises active switching elements, e.g. TFT]
1/167 . . . based on electrophoresis
2001/1672 . . . [of the micropuf type]
2001/1674 . . . [comprising a dry toner particle]
2001/1676 . . . [having a particular electrode]
2001/1678 . . . [having a particular composition or particle type]

1/17 . . . based on variable absorption elements
(G02F 1/015 - G02F 1/167 take precedence; (tenebrescent compositions C09K 9/00))

1/172 . . . [based on a suspension of orientable dipolar particles, e.g. suspended particles displays]
1/174 . . . [based on absorption band-shift, e.g. Stark - or Franz-Keldysh effect (G02F 1/015, G02F 1/178 take precedence)]

1/176 . . . [using acid-based indicators]
1/178 . . . [based on pressure effects (G02F 1/195 takes precedence)]

1/19 . . . based on variable reflection or refraction elements
(G02F 1/015 - G02F 1/167 take precedence)

1/195 . . . [by using frustrated reflection (digital reflection using controlled total internal reflection G02F 1/315)]

1/21 . . . by interference
2001/211 . . . [Sagnac type]
2001/212 . . . [Mach-Zender type]
2001/213 . . . [Fabry-Perot type]
2001/215 . . . [Michelson type]

1/216 . . . [using liquid crystals, e.g. liquid crystal Fabry-Perot filters]

2001/217 . . . [Multi mode interference type]
1/218 . . . [using semi-conducting materials]
1/225 . . . [in an optical waveguide structure]
1/2252 . . . [in optical fibres]
1/2255 . . . [controlled by a high-frequency electromagnetic component in an electric waveguide structure]
1/2257 . . . [the optical waveguides being made of semiconducting material]

1/23 . . . for the control of the colour
(G02F 1/03 - G02F 1/21 take precedence)
1/25 . . . as to hue or predominant wavelength
1/29 . . . for the control of the position or the direction of light beams, i.e. deflection ((optical coupling means G02B 6/26; optical-mechanical scanning in general G02B 26/10) ; static stores with electric or magnetic read-in and optical read-out G11C; lasers provided with means to change the location from which, or the direction in which, laser radiation is emitted H01S 3/101)

2001/291 . . . [Two-dimensional analog deflection]
1/292 . . . [by controlled diffraction or phased-array beam steering (controlled diffraction for optical switching G02F 1/31)]
1/293 . . . [by another light beam, i.e. opto-optical deflection]

2001/294 . . . [Variable focal length device]
1/295 . . . [Analog deflection from or] in an optical waveguide structure
1/2955 . . . [by controlled diffraction or phased-array beam steering (controlled diffraction for optical waveguide switching G02F 1/313)]

1/31 . . . Digital deflection, [i.e. optical switching]
(G02F 1/33 takes precedence)

2001/311 . . . [Cascade arrangement of plural switches]
1/313 . . . [in an optical waveguide structure]
1/3131 . . . [in optical fibres]
1/3132 . . . [of directional coupler type (all-optical modulation, gating or switching using a non-linear directional coupler G02F 1/3521)]
1/3133 . . . [the optical waveguides being made of semiconducting materials]
1/3134 . . . [controlled by a high-frequency electromagnetic wave component in an electric waveguide structure]

2001/3135 . . . [vertical structure]
1/3136 . . . [of interferometric switch type]
1/3137 . . . [with intersecting or branching waveguides, e.g. X-switches and Y-junctions]
1/3138 . . . [the optical waveguides being made of semiconducting materials]
1/315 . . . based on the use of controlled internal reflection
1/33 . . . Acousto-optical deflection devices ([circuit or control arrangements therefor G02F 1/113])
1/332 . . . [comprising a plurality of transducers on the same crystal surface, e.g. multi-channel Bragg cell]
1/335 . . . [having an optical waveguide structure]
1/35 . . . Non-linear optics (optical bistable devices G02F 3/02; lasers using stimulated Brillouin or Raman effect H01S 3/30]

1/3501 . . . [Constructional arrangements of non-linear optical devices, e.g. shape of non-linear crystals (constructional arrangements of electro-optic devices G02F 1/0305)]
2001/3503 . . . [Structural association of optical elements, e.g. lenses, with the nonlinear optical device]
2001/3505 . . . [Coatings; Housings; Supports]
2001/3507 . . . [Arrangements comprising two or more nonlinear optical devices]
2001/3509 . . . [Shape, e.g. shape of end face]
1/3511 . . . [Self-focusing or self-trapping of light; Light-induced birefringence; Induced optical Kerr-effect (photo refractive effects of electro-optic crystals G02F 1/0338, G02F 1/0541, of ceramics G02F 1/0558; opto-optical modulation G02F 1/0126; opto-optical deflection G02F 1/393)]

1/3513 . . . [Soliton propagation]
1/3515 . . . [All-optical modulation, gating, switching, e.g. control of a light beam by another light beam (G02F 1/353, G02F 1/37, G02F 1/39 take precedence)]
1/3517 . . . [using an interferometer]
1/3519 . . . [of Sagnac type, i.e. nonlinear optical loop mirror [NOLM]]
1/3521 . . . [using a directional coupler]
1/3523 . . . [Non-linear absorption changing by light, e.g. bleaching (laser Q-switching using bleachable media H01S 3/113)]
1/3525 . . . [Optical damage]
1/3526 . . . [using two-photon emission or absorption processes (Raman effect H01S 3/30)]

2001/3528 . . . [for producing a supercontinuum]
1/353 . . . (Frequency conversion, i.e. wherein a light beam with frequency components different from those of the incident light beams is generated (second harmonic generation G02F 1/37; optical parametric generation or amplification G02F 1/39; transferring the modulation of modulated light G02F 2/004; optical pumping of a laser by another laser H01S 3/094; nonlinear optical devices inside a laser cavity H01S 3/108))

1/3532 . . . (Arrangements of plural nonlinear devices for generating multi-colour light beams, e.g. arrangements of SHG, SPG, OPO devices for generating RGB light beams)

1/3534 . . . (Three-wave interaction, e.g. sum-difference frequency generation (G02F 1/3532 takes precedence))

1/3536 . . . (Four-wave interaction)

1/3538 . . . (for optical phase conjugation (H01S 3/10076 takes precedence))

2001/354 . . . (Third or higher harmonic generation)

2001/3542 . . . (Multi-pass arrangements, i.e. arrangements to pass light a plurality of times through the same element, e.g. by using an enhancement cavity)

1/3544 . . . (Particular phase matching techniques)

2001/3546 . . . (Active phase matching, e.g. by electro- or thermo-optic tuning)

2001/3548 . . . (Quasi-phase-matching [QPM], e.g. using a periodic domain inverted structure)

1/355 . . . characterised by the materials used

1/3551 . . . [Crystals]

1/3553 . . . (having the formula MTIOYO4, where M=K, Rb, TI, NH4 or Cs and Y=P or As, e.g. KTP)

1/3555 . . . [Glasses]

1/3556 . . . (Semiconductor materials, e.g. quantum wells)

1/3558 . . . (Poled materials, e.g. with periodic poling; Fabrication of domain inverted structures, e.g. for quasi-phase-matching [QPM])

1/361 . . . Organic materials

1/3611 . . . (containing Nitrogen)

1/3612 . . . (Heterocycles having N as heteroatom)

1/3613 . . . (containing Sulfur)

1/3614 . . . (Heterocycles having S as heteroatom)

1/3615 . . . (containing polymers)

1/3616 . . . (having the non-linear optical group in the main chain)

1/3617 . . . (having the non-linear optical group in a side chain)

1/3618 . . . (Langmuir Blodgett Films)

1/3619 . . . (Organometallic compounds)

1/365 . . . (in an optical waveguide structure (G02F 1/377, G02F 1/395 takes precedence))

1/37 . . . (for second-harmonic generation ([G02F 1/3532 takes precedence]))

2001/372 . . . (means for homogenizing the output beam)

2001/374 . . . (Cerenkov radiation)

1/377 . . . (in an optical waveguide structure)

1/3775 . . . (with a periodic structure, e.g. domain inversion, for quasi-phase-matching [QPM] (G02F 1/383 takes precedence))

1/383 . . . (of the optical fibre type)

1/39 . . . (for parametric generation or amplification of light, infra-red or ultra-violet waves ([G02F 1/3532 takes precedence]; ] electrical parametric amplifiers H03F 7/00)

2001/392 . . . (Parametric amplification)

1/395 . . . (in optical waveguides)

1/397 . . . (Amplification of light by wave mixing involving an interference pattern, e.g. using photorefractive material)

2/00 . . . Demodulating light; Transferring the modulation of modulated light; Frequency-changing of light (G02F 1/35 takes precedence; photoelectric detecting or measuring devices G01J, H01J 40/00, H01L 31/00; demodulating laser arrangements, i.e. switching, gating) H01S 3/10; demodulation or transference of modulation of modulated electro-magnetic waves in general H03D 9/00)

2002 . . . (using optical mixing (homodyne, heterodyne systems H04B 10/142))

2004 . . . (Transferring the modulation of modulated light, i.e. transferring the information from one optical carrier of a first wavelength to a second optical carrier of a second wavelength, e.g. all-optical wavelength converter)

2002/006 . . . (All-optical wavelength conversion)

2002/008 . . . (Opto-electronic wavelength conversion, i.e. involving photo-detection of the first optical carrier)

2/02 . . . Frequency-changing of light, e.g. by quantum counters (luminescent materials C09K 11/00)

3/00 . . . Optical logic elements (optical computing G06E); electric pulse generators using opto-electronic devices as active elements H03K 3/42; logic circuits using opto-electronic devices H03K 19/14; Optical bistable devices

3/02 . . . Optical bistable devices

3/022 . . . (based on electro-, magneto- or acousto-optical elements (G02F 3/028 takes precedence))

3/024 . . . (based on nonlinear elements, e.g. non-linear Fabry-Perot cavity (G02F 3/028 takes precedence))

3/026 . . . (based on laser effects)

3/028 . . . (based on self electro-optic effect devices [SEED])

7/00 . . . Optical analogue/digital converters

NOTE

This group covers only converters based in substantial manner on elements which are provided for in group G02F 1/00.

2201/000 . . . Constructional arrangements not provided for in groups G02F 1/00 - G02F 7/00

2201/02 . . . fibre

2201/04 . . . monomode

2201/05 . . . multimode

2201/06 . . . integrated waveguide

2201/063 . . . ridge; rib; strip loaded

2201/066 . . . channel; buried

2201/07 . . . buffer layer

2201/08 . . . light absorbing layer

2201/083 . . . infra-red absorbing

2201/086 . . . UV absorbing
Materials and properties

- electrode
- common or background
- having a particular pattern
- pixel
- interdigital
- delta-beta
- push-pull
- travelling wave
- field shaping
- asymmetric
- periodic
- series; tandem
- Multi-pass arrangements, i.e. arrangements to pass light a plurality of times through the same element, e.g. by using an enhancement cavity
- parallel
- delay line
- of fibre type
- grating
- grating coupler
- diffraction grating
- Reflective grating, i.e. Bragg grating
- reflector
- cholesteric liquid crystal reflector
- distributed (Bragg) reflector
- Airflow channels, e.g. constructional arrangements facilitating the flow of air
- Anti-reflection arrangements
- Arrangements for improving the aperture ratio
- Arrangements for providing conduction through an insulating substrate
- Arrangements combining different electro-active layers, e.g. electrochromic, liquid crystal or electroluminescent layers
- Fixing elements
- Snap-fit
- Flattening arrangements
- Protective arrangements
- Blocking layers, e.g. against migration of ions
- Arrangements improving the resistance to shock
- Arrangements improving the resistance to acoustic resonance like noise
- Repairing, e.g. with redundant arrangement against defective part
- Pseudo repairing, e.g. a defective part is brought into a condition in which it does not disturb the functioning of the device
- RGB geometrical arrangements
- Arrangements for reducing warping-twist
- Substrates having a particular shape, e.g. non-rectangular
- Arrangements comprising a monitoring photodetector

Materials and properties

- dipole
- organic material
- low molecular weight
- polymeric
- curable
- thermocurable
- charge transfer complex
- Langmuir-Blodgett film
- photobleached
dye
- pleochroic
- fluorescent
dopant
poled
glass transition temperature
- inorganic glass
- semiconductor
- GaAs and alloy
- InP and alloy
- a-Si
- poly-Si
- single crystal Si
- CdSe or CdTe and alloys
- ZnSe or ZnS and alloys
- quantum wells
- photoconductor
- photorefractive
- photochromic
- conductive
- LiNbO3, LiTaO3
- Antistatic materials or arrangements
- Adhesive materials or arrangements
- Metamaterials
- Photoactive crystals
- Metal hydrides materials
- Micro- or nanomaterials
- Sol-gel materials
- Materials having a particular birefringence, retardation
- Materials having a particular dielectric constant
- Test HW

Function characteristic

- transmissive
- reflective
- total internal reflection
- attenuated or frustrated internal reflection
- scattering
- wavelength independent
- wavelength dependent
- wavelength filtering
- Polarisation independent
- Polarisation dependent
- transfective
- plasmon
- involving infrared radiation
- spatial light modulator
- involving THZ radiation
- involving resonance effects, e.g. resonantly enhanced interaction
- involving spin polarization effects
- involving soliton waves
- adaptive optics, e.g. wavefront correction
- linearised modulation; reduction of harmonic distortions
- Intrinsic phase difference, i.e. optical bias, of an optical modulator; Methods for the pre-set thereof
- Thermal instability, i.e. DC drift, of an optical modulator; Arrangements or methods for the reduction thereof
diffractive
beam steering
Frequency chirping of an optical modulator;
Arrangements or methods for the pre-set or tuning thereof
Negative chirp
Pulse shaping; Apparatus or methods therefor
focussing or defocussing
Gray scale
Colour display without the use of colour mosaic filters
Variable attenuator
Phase-only modulation
Optical limiters
Optical pulse train (comb) synthesizer
Frequency comb synthesizer
Multi-wavelength, e.g. operation of the device at a plurality of wavelengths
Add/drop devices
Temperature independent
Switchable arrangements whereby the element being usually not switchable
Normally black display, i.e. the off state being black
Normally white display, i.e. the off state being white
Green display, e.g. recycling, reduction of harmful substances
Arrangements or methods for testing or calibrating a device
Semiconductor optical amplifier [SOA] used in a device covered by \textit{G02F}

\textbf{Indexing scheme related to G02F 1/13363,}
\textit{i.e. to birefringent elements, e.g. for optical compensation, characterised by the number, position, orientation or value of the compensation plates}

Number of plates being 1
Number of plates being 2
Number of plates being 3
Number of plates greater than or equal to 4
Single plate on one side of the LC cell
Two plates on one side of the LC cell
All plates on one side of the LC cell
with a particular optical axis orientation
with a spatial distribution of the retardation value
with refractive index ellipsoid inclined, or tilted, relative to the LC-layer surface \(O\) plate
with varying inclination in thickness direction, e.g. hybrid oriented discotic LC
The refractive index \(N_z\) perpendicular to the element surface being different from in-plane refractive indices \(N_x\) and \(N_y\), e.g. \(C\) plate
Biaxial compensators
Positive birefringence
Negative birefringence
with twisted orientation, e.g. comprising helically oriented LC-molecules or a plurality of twisted birefringent sublayers