SECTION H — ELECTRICITY

H01 ELECTRIC ELEMENTS

H01S DEVICES USING THE PROCESS OF LIGHT AMPLIFICATION BY STIMULATED EMISSION OF RADIATION [LASER] TO AMPLIFY OR GENERATE LIGHT; DEVICES USING STIMULATED EMISSION OF ELECTROMAGNETIC RADIATION IN WAVE RANGES OTHER THAN OPTICAL

Note(s) [2, 2019.01]

This subclass covers:

a. devices using the stimulated emission of radiation by excited atoms or molecules to amplify or generate coherent monochromatic electromagnetic radiation;
b. functions as modulating, demodulating, controlling or stabilising such coherent monochromatic electromagnetic radiation.

Subclass index

1/00 Masers, i.e. devices using stimulated emission of electromagnetic radiation in the microwave range [1, 2006.01]

1/02 • solid **[1, 2006.01]**

1/04 • liquid **[1, 2006.01]**

1/06 • gaseous **[1, 2006.01]**

3/00 Lasers, i.e. devices using stimulated emission of electromagnetic radiation in the infrared, visible or ultraviolet wave range (semiconductors lasers H01S 5/00) **[1, 2006.01]**

3/02 • Constructional details **[1, 2006.01]**

3/03 • • of gas laser discharge tubes **[2, 2006.01]**

3/032 • • • for confinement of the discharge, e.g. by special features of the discharge constricting tube **[5, 2006.01]**

3/034 • • • Optical devices within, or forming part of, the tube, e.g. windows, mirrors (reflectors having variable properties or positions for initial adjustment of the resonator H01S 3/086) **[5, 2006.01]**

3/036 • • • Means for obtaining or maintaining the desired gas pressure within the tube, e.g. by gettering or replenishing; Means for circulating the gas, e.g. for equalising the pressure within the tube **[5, 2006.01]**

3/038 • • • Electrodes, e.g. special shape, configuration or composition **[5, 2006.01]**

3/04 • • Arrangements for thermal management **[1, 2006.01]**

3/041 • • • for gas lasers **[5, 2006.01]**

3/042 • • • for solid state lasers **[5, 2006.01]**

3/05 • Construction or shape of optical resonators; Accommodation of active medium therein; Shape of active medium **[1, 2006.01]**

3/06 • • Construction or shape of active medium **[1, 2006.01]**

3/063 • • • Waveguide lasers, e.g. laser amplifiers **[7, 2006.01]**

3/067 • • • • Fibre lasers **[7, 2006.01]**

3/07 • • • consisting of a plurality of parts, e.g. segments (H01S 3/067 takes precedence) **[2, 7, 2006.01]**

3/08 • • Construction or shape of optical resonators or components thereof **[1, 2, 2006.01, 2023.01]**

3/08018 • • • Mode suppression **[2023.01]**

3/08022 • • • • Longitudinal modes (mode suppression using a plurality of resonators H01S 3/082) **[2023.01]**

3/08031 • • • • • Single-mode emission **[2023.01]**

3/08036 • • • • • • using intracavity dispersive, polarising or birefringent elements **[2023.01]**

3/0804 • • • • Transverse or lateral modes **[2023.01]**

3/08045 • • • • • Single-mode emission **[2023.01]**

3/0805 • • • • • by apertures, e.g. pin-holes or knife-edges **[2023.01]**

3/081 • • • comprising three or more reflectors **[2, 2006.01]**

3/082 • • • • defining a plurality of resonators, e.g. for mode selection or suppression **[2, 2006.01]**

3/083 • • • • Ring lasers **[2, 2006.01]**

3/086 • • • One or more reflectors having variable properties or positions for initial adjustment of the resonator (varying a parameter of the laser output during operation H01S 3/10; stabilisation of the laser output H01S 3/13) **[2, 2006.01]**

3/09 • Processes or apparatus for excitation, e.g. pumping **[1, 2006.01]**

3/091 • • using optical pumping **[2, 2006.01]**

3/0915 • • • by incoherent light **[5, 2006.01]**

3/092 • • • • of flash lamp (H01S 3/0937 takes precedence) **[2, 5, 2006.01]**
3/093 • • • • • focusing or directing the excitation energy into the active medium **[2, 5, 2006.01]**
3/0933 • • • of a semiconductor, e.g. light emitting diode **[5, 2006.01]**
3/0937 • • • produced by exploding or combustible material **[5, 2006.01]**
3/094 • • by coherent light **[2, 2006.01]**
3/0941 • • • of a semiconductor laser, e.g. of a laser diode **[6, 2006.01]**
3/0943 • • • of a gas laser **[5, 2006.01]**
3/0947 • • • of an organic dye laser **[5, 2006.01]**
3/095 • • using chemical or thermal pumping **[2, 2006.01]**
3/0951 • • • by increasing the pressure in the laser gas medium **[5, 2006.01]**
3/0953 • • • • Gas dynamic lasers, i.e. with expansion of the laser gas medium to supersonic flow speeds **[5, 2006.01]**
3/0955 • • using pumping by high energy particles **[5, 2006.01]**
3/0957 • • • by high energy nuclear particles **[5, 2006.01]**
3/0959 • • • by an electron beam **[5, 2006.01]**
3/097 • • by gas discharge of a gas laser **[2, 2006.01]**
3/0971 • • • transversely excited (H01S 3/0975 takes precedence) **[5, 2006.01]**
3/0973 • • • • having a travelling wave passing through the active medium **[5, 2006.01]**
3/0975 • • • using inductive or capacitive excitation **[5, 2006.01]**
3/0977 • • • having auxiliary ionisation means **[5, 2006.01]**
3/0979 • • • Gas dynamic lasers, i.e. with expansion of the laser gas medium to supersonic flow speeds **[5, 2006.01]**
3/10 • Controlling the intensity, frequency, phase, polarisation or direction of the emitted radiation, e.g. switching, gating, modulating or demodulating **[1, 2, 2006.01]**
3/101 • • Lasers provided with means to change the location from which, or the direction in which, laser radiation is emitted **[2, 2006.01]**
3/102 • • by controlling the active medium, e.g. by controlling the processes or apparatus for excitation (H01S 3/13 takes precedence) **[4, 2006.01]**
3/104 • • • in gas lasers **[4, 2006.01]**
3/105 • • by controlling the mutual position or the reflecting properties of the reflectors of the cavity (H01S 3/13 takes precedence) **[4, 2006.01]**
3/1055 • • • one of the reflectors being constituted by a diffraction grating **[4, 2006.01]**
3/106 • • by controlling devices placed within the cavity (H01S 3/13 takes precedence) **[4, 2006.01]**
3/107 • • • using electro-optic devices, e.g. exhibiting Pockels or Kerr effect **[4, 2006.01]**
3/108 • • • using non-linear optical devices, e.g. exhibiting Brillouin or Raman scattering **[4, 2006.01]**
3/109 • • • • Frequency multiplication, e.g. harmonic generation **[4, 2006.01]**
3/11 • • Mode locking; Q-switching; Other giant-pulse techniques, e.g. cavity dumping **[1, 2006.01, 2023.01]**
3/1106 • • • Mode locking **[2023.01]**
3/1109 • • • • Active mode locking **[2023.01]**
3/1112 • • • • Passive mode locking **[2023.01]**
3/1115 • • • • • using intracavity saturable absorbers **[2023.01]**
3/1118 • • • • • • Semiconductor saturable absorbers, e.g. semiconductor saturable absorber mirrors [SESAMs]; Solid-state saturable absorbers, e.g. carbon nanotube [CNT] based **[2023.01]**
3/1123 • • • Q-switching **[2023.01]**
3/113 • • • • using intracavity saturable absorbers **[2, 2006.01]**
3/115 • • • • using intracavity electro-optic devices **[4, 2006.01]**
3/117 • • • • using intracavity acousto-optic devices **[4, 2006.01]**
3/121 • • • • using intracavity mechanical devices **[4, 2006.01]**
3/123 • • • • • using rotating mirrors **[4, 2006.01]**
3/125 • • • • • using rotating prisms **[4, 2006.01]**
3/127 • • • • Plural Q-switches **[4, 2006.01]**
3/13 • • Stabilisation of laser output parameters, e.g. frequency or amplitude **[2, 2006.01]**
3/131 • • • by controlling the active medium, e.g. by controlling the processes or apparatus for excitation **[4, 2006.01]**
3/134 • • • • in gas lasers **[4, 2006.01]**
3/136 • • • by controlling devices placed within the cavity **[4, 2006.01]**
3/137 • • • • for stabilising of frequency **[4, 2006.01]**
3/139 • • • by controlling the mutual position or the reflecting properties of the reflectors of the cavity **[4, 2006.01]**
3/14 • characterised by the material used as the active medium **[1, 2006.01]**
3/16 • • Solid materials **[1, 2006.01]**
3/17 • • • amorphous, e.g. glass **[2, 2006.01]**
3/20 • • Liquids **[1, 2006.01]**
3/207 • • • including a chelate **[5, 2006.01]**
3/213 • • • including an organic dye **[5, 2006.01]**
3/22 • • Gases **[1, 2006.01]**
3/223 • • • the active gas being polyatomic, i.e. containing two or more atoms (H01S 3/227 takes precedence) **[2, 5, 2006.01]**
3/225 • • • • comprising an excimer or exciplex **[5, 2006.01]**
3/227 • • • Metal vapour **[5, 2006.01]**
3/23 • Arrangement of two or more lasers not provided for in groups H01S 3/02-H01S 3/14, e.g. tandem arrangement of separate active media (involving only semiconductor lasers H01S 5/40) **[2, 7, 2006.01]**
3/30 • using scattering effects, e.g. stimulated Brillouin or Raman effects **[2, 2006.01]**

4/00 Devices using stimulated emission of electromagnetic radiation in wave ranges other than those covered by groups H01S 1/00, H01S 3/00 or H01S 5/00, e.g. phonon masers, X-ray lasers or gamma-ray lasers [1, 2006.01]

5/00 Semiconductor lasers (superluminescent diodes H10H 20/00) **[7, 2006.01]**

Note(s) [2010.01]

Attention is drawn to Note (3) after the title of section C, which Note indicates to which version of the Periodic Table of chemical elements the IPC refers. In this group, the system used is the 8 group system indicated by Roman numerals in the Periodic Table thereunder.

5/02 • Structural details or components not essential to laser action **[7, 2006.01]**

5/022 • • Mountings; Housings **[7, 2006.01, 2021.01]**

5/02208• • • characterised by the shape of the housings **[2021.01]**

5/02212• • • • Can-type, e.g. TO-CAN housings with emission along or parallel to symmetry axis **[2021.01]**

5/02216• • • • Butterfly-type, i.e. with electrode pins extending horizontally from the housings **[2021.01]**

5/02218• • • Material of the housings; Filling of the housings **[2021.01]**

5/0222 • • • • Gas-filled housings **[2021.01]**

5/02224• • • • • the gas comprising oxygen, e.g. for avoiding contamination of the light emitting facets **[2021.01]**

5/02232• • • • Liquid-filled housings **[2021.01]**

5/02234• • • • Resin-filled housings; the housings being made of resin **[2021.01]**

5/02235• • • Getter material for absorbing contamination **[2021.01]**

5/0225 • • • Out-coupling of light **[2021.01]**

5/02251• • • • using optical fibres **[2021.01]**

5/02253• • • • using lenses **[2021.01]**

5/02255• • • • using beam deflecting elements **[2021.01]**

5/02257• • • • using windows, e.g. specially adapted for back-reflecting light to a detector inside the housing **[2021.01]**

5/023 • • • Mount members, e.g. sub-mount members **[2021.01]**

5/0231 • • • • Stems **[2021.01]**

5/02315• • • • Support members, e.g. bases or carriers **[2021.01]**

5/0232 • • • • Lead-frames **[2021.01]**

5/02325• • • • Mechanically integrated components on mount members or optical micro-benches **[2021.01]**

5/02326• • • • • Arrangements for relative positioning of laser diodes and optical components, e.g. grooves in the mount to fix optical fibres or lenses **[2021.01]**

5/0233 • • • Mounting configuration of laser chips **[2021.01]**

5/02335• • • • Up-side up mountings, e.g. epi-side up mountings or junction up mountings **[2021.01]**

5/0234 • • • • Up-side down mountings, e.g. Flip-chip, epi-side down mountings or junction down mountings **[2021.01]**

5/02345• • • • Wire-bonding **[2021.01]**

5/0235 • • • Method for mounting laser chips **[2021.01]**

5/02355• • • • Fixing laser chips on mounts **[2021.01]**

5/0236 • • • • • using an adhesive **[2021.01]**

5/02365• • • • • by clamping **[2021.01]**

5/0237 • • • • • by soldering **[2021.01]**

5/02375• • • • Positioning of the laser chips **[2021.01]**

5/0238 • • • • • using marks **[2021.01]**

5/02385• • • • • using laser light as reference **[2021.01]**

5/0239 • • • • Combinations of electrical or optical elements **[2021.01]**

5/024 • • Arrangements for thermal management **[7, 2006.01]**

5/026 • • Monolithically integrated components, e.g. waveguides, monitoring photo-detectors or drivers (stabilisation of output H01S 5/06) **[7, 2006.01]**

5/028 • • Coatings **[7, 2006.01]**

5/04 • Processes or apparatus for excitation, e.g. pumping (H01S 5/06 takes precedence) **[7, 2006.01]**

5/042 • • Electrical excitation **[7, 2006.01]**

5/06 • Arrangements for controlling the laser output parameters, e.g. by operating on the active medium **[7, 2006.01]**

5/062 • • by varying the potential of the electrodes (H01S 5/065 takes precedence) **[7, 2006.01]**

5/0625 • • • in multi-section lasers **[7, 2006.01]**

5/065 • • Mode locking; Mode suppression; Mode selection **[7, 2006.01]**

5/068 • • Stabilisation of laser output parameters (H01S 5/0625 takes precedence) **[7, 2006.01]**

5/0683 • • • by monitoring the optical output parameters **[7, 2006.01]**

5/0687 • • • • Stabilising the frequency of the laser **[7, 2006.01]**

5/10 • Construction or shape of the optical resonator **[7, 2006.01, 2021.01]**

5/11 • • Comprising a photonic bandgap structure **[2021.01]**

5/12 • • the resonator having a periodic structure, e.g. in distributed feedback [DFB] lasers (comprising a photonic bandgap structure H01S 5/11; surface-emitting lasers H01S 5/18) **[7, 2006.01, 2021.01]**

5/125 • • • Distributed Bragg reflector [DBR] lasers **[7, 2006.01]**

5/14 • • External cavity lasers (H01S 5/18 takes precedence; mode locking H01S 5/065) **[7, 2006.01]**

5/16 • • Window-type lasers, i.e. with a region of non-absorbing material between the active region and the reflecting surface (H01S 5/14 takes precedence) **[7, 2006.01]**

5/18 • • Surface-emitting [SE] lasers, e.g. having both horizontal and vertical cavities **[7, 2006.01, 2021.01]**

5/183 • • • having only vertical cavities, e.g. vertical cavity surface-emitting lasers [VCSEL] **[7, 2006.01]**

5/185 • • • having only horizontal cavities, e.g. horizontal cavity surface-emitting lasers [HCSEL] (comprising a photonic bandgap structure H01S 5/11) **[2021.01]**

5/187 • • • • using Bragg reflection **[7, 2006.01]**

5/20 • Structure or shape of the semiconductor body to guide the optical wave **[7, 2006.01]**

5/22 • • having a ridge or a stripe structure **[7, 2006.01]**

5/223 • • • Buried stripe structure (H01S 5/227 takes precedence) **[7, 2006.01]**

5/227 • • • Buried mesa structure **[7, 2006.01]**

5/24 • • having a grooved structure, e.g. V-grooved **[7, 2006.01]**

5/30 • Structure or shape of the active region; Materials used for the active region **[7, 2006.01]**

5/32 • • comprising PN junctions, e.g. hetero- or double-hetero-structures (H01S 5/34, H01S 5/36 take precedence) **[7, 2006.01]**

5/323 • • • in $A_{III}B_{V}$ compounds, e.g. AlGaAs-laser **[7, 2006.01]**

5/327 • • • in $A_{II}B_{VI}$ compounds, e.g. ZnCdSe-laser **[7, 2006.01]**

5/34 • • comprising quantum well or superlattice structures, e.g. single quantum well [SQW] lasers, multiple quantum well [MQW] lasers or graded index separate confinement heterostructure [GRINSCH] lasers (H01S 5/36 takes precedence) **[7, 2006.01]**

5/343 • • • in $A_{III}B_{V}$ compounds, e.g. AlGaAs-laser **[7, 2006.01]**

5/347 • • • in $A_{II}B_{VI}$ compounds, e.g. ZnCdSe-laser **[7, 2006.01]**

5/36 • • comprising organic materials **[2006.01]**

5/40 • Arrangement of two or more semiconductor lasers, not provided for in groups H01S 5/02-H01S 5/30 (H01S 5/50 takes precedence) **[7, 2006.01]**

5/42 • • Arrays of surface emitting lasers **[7, 2006.01]**

5/50 • Amplifier structures not provided for in groups H01S 5/02-H01S 5/30 **[7, 2006.01]**