COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY
(NOTE omitted)

H01 BASIC ELECTRIC ELEMENTS
(NOTE omitted)

H01J ELECTRIC DISCHARGE TUBES OR DISCHARGE LAMPS (spark-gaps H01T; arc lamps with consumable electrodes H05B; particle accelerators H05H)

NOTES

1. This subclass covers only devices for producing, influencing, or using a flow of electrons or ions, e.g. for controlling, indicating, or switching of electric current, counting electric pulses, producing light or other electromagnetic oscillations, such as X-rays, or for separating or analysing radiation or particles, and having a closed or substantially closed casing containing a chosen gas, vapour, or vacuum, upon the pressure and nature of which the characteristics of the device depend. Light sources using a combination (other than covered by group H01J 61/96 of this subclass) of discharge and other kinds of light generation are dealt with in H05B 35/00.

2. In this subclass, groups H01J 1/00 - H01J 7/00 relate only to:
   i. details of an unspecified kind of discharge tube or lamp, or
   ii. details mentioned in a specification as applicable to two or more kinds of tubes or lamps as defined by groups H01J 11/00, H01J 13/00, H01J 17/00, H01J 21/00, H01J 25/00, H01J 27/00, H01J 31/00, H01J 33/00, H01J 35/00, H01J 37/00, H01J 40/00, H01J 41/00, H01J 47/00, H01J 49/00, H01J 61/00, H01J 63/00 or H01J 65/00, hereinafter called basic kinds. A detail only described with reference to, or clearly only applicable to, tubes or lamps of a single basic kind is classified in the detail group appropriate to tubes or lamps of that basic kind, e.g. H01J 17/04.

3. In this subclass, the following term is used with the meaning indicated:
   • “lamp” includes tubes emitting ultra-violet or infra-red light.

4. Attention is drawn to the definition of the expression “spark gaps” given in the Note following the title of subclass H01T.

5. Apparatus or processes specially adapted for the manufacture of electric discharge tubes, discharge lamps, or parts thereof are classified in group H01J 9/00.

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00 Details of electrodes, of magnetic control means, of screens, or of the mounting or spacing thereof, common to two or more basic types of discharge tubes or lamps (details of electron-optical arrangements or of ion traps H01J 3/00)

1/02 Main electrodes
1/025 {Hollow cathodes}
1/04 Liquid electrodes, e.g. liquid cathode
1/05 . . . characterised by material
1/06 . . . Containers for liquid-pool electrodes; Arrangement or mounting thereof
1/08 . . . Positioning or moving the cathode spot on the surface of a liquid-pool cathode
1/10 . . . Cooling, heating, circulating, filtering, or controlling level of liquid in a liquid-pool electrode
1/12 . . . Cathodes having mercury or liquid alkali metal deposited on the cathode surface during operation of the tube
1/13 . . . Solid thermonic cathodes
1/135 {Circuit arrangements therefor, e.g. for temperature control}
1/14 . . . characterised by the material
1/142 . . . with alkaline-earth metal oxides, or such oxides used in conjunction with reducing agents, as an emissive material
1/144 . . . with other metal oxides as an emissive material
1/146 . . . with metals or alloys as an emissive material
1/148 . . . with compounds having metallic conductive properties, e.g. lanthanum boride, as an emissive material
1/15 . . . Cathodes heated directly by an electric current
1/16 . . . characterised by the shape
1/18 . . . Supports; Vibration-damping arrangements
1/20 . . . Cathodes heated indirectly by an electric current; Cathodes heated by electron or ion bombardment
1/22 . . . Heaters
1/24 . . . Insulating layer or body located between heater and emissive material
1/26 . . . Supports for the emissive material
1/28 . . . Dispenser-type cathodes, e.g. L-cathode
1/30 . . . Cold cathodes, e.g. field-emissive cathode
1/304 . . . Field-emissive cathodes
1/3042 . . . {microengineered, e.g. Spindt-type}
1/3044 . . . {Point emitters}
1/3046 . . . {Edge emitters}
1/3048 . . . {Distributed particle emitters}
1/308 . . . Semiconductor cathodes, e.g. cathodes with PN junction layers
having an electric field perpendicular to the surface, e.g. tunnel-effect cathodes of Metal-Insulator-Metal [MIM] type

Secondary-electron-emitting electrodes

Photo-emissive cathodes

Electrodes exhibiting both secondary emission and photo-emission

Solid anodes; Solid auxiliary anodes for maintaining a discharge

characterised by the material

characterised by the material

Cooling of anodes (cooling rotary anodes

Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes

Control electrodes, e.g. grid (for igniting arrangements

Auxiliary electrodes (auxiliary anodes for maintaining a discharge

characterised by the material

forming part of the envelope of the tube or lamp

Coating of anodes

Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes

Magnetic means for controlling the discharge

Screens for shielding; Guides for influencing the discharge; Masks interposed in the electron stream

Electrodes intimately associated with a screen on or from which an image or pattern is formed, picked up, converted, or stored (see provisionally also

Screens on or from which an image or pattern is formed, picked up, converted, or stored; Luminescent coatings on vessels (see provisionally also

acting as light valves by shutter operation, e.g. for endoscope (see provisionally also

acting by discoloration, e.g. halide screen (see provisionally also

Incandescent screens (see provisionally also

Luminescent screens; Selection of materials for luminescent coatings on vessels (see provisionally also

characterised by the luminescent material

characterised by the binder or adhesive for securing the luminescent material to its supports (see provisionally also

Supports for luminescent material

with superimposed luminescent layers (see provisionally also

with protective, conductive, or reflective layers (see provisionally also

with luminescent material discontinuously arranged, e.g. in dots or lines (see provisionally also

with adjacent dots or lines of different luminescent material (see provisionally also

provided with permanent marks or references (see provisionally also

Photoelectric screens; Charge-storage screens (see provisionally also

Mounting, supporting, spacing, or insulating of electrodes or of electrode assemblies

Insulation between electrodes or supports within the vacuum space

Mountings for the electrode assembly as a whole

Mountings for individual electrodes

Spacing members extending to the envelope

without fixed connection between spacing member and envelope

Details of electron-optical or ion-optical arrangements or of ion traps common to two or more basic types of discharge tubes or lamps

Electron guns ([electron guns for discharge tubes with provision for introducing objects or material to be exposed to the discharge H01J 37/06; for cathode ray tubes H01J 29/48]

Electron guns using a field emission, photo emission, or secondary emission electron source

[with microengineered cathode, e.g. Spindt-type]

Electron guns using electron multiplication

Electron guns using thermionic emission of cathode heated by electron or ion bombardment or by irradiation by other energetic beams, e.g. by laser

Electron guns using a discharge in a gas or a vapour as electron source (gas-filled discharge tubes with gaseous cathodes H01J 15/00)

[Eliminating deleterious effects due to thermal effects, electric or magnetic field

Construction of the gun or parts thereof (H01J 3/021, H01J 3/025, H01J 3/026 and H01J 3/028 take precedence)

Replacing parts of the gun; Relative adjustment (H01J 3/021, H01J 3/025 take precedence)

[Schematic arrangements for beam forming

Ion guns (see provisionally also H01J 27/00)

two or more guns being arranged in a single vacuum space, e.g. for plural-ray tubes (H01J 3/07 takes precedence (see provisionally also

Arrangements for controlling convergence of a plurality of beams (see provisionally also

Arrangements for controlling intensity of ray or beam (H01J 3/02, H01J 3/04 take precedence (see provisionally also

Arrangements for centering ray or beam (H01J 3/02, H01J 3/04 take precedence (see provisionally also

Arrangements for controlling cross-section of ray or beam; Arrangements for correcting aberration of beam, e.g. due to lenses (H01J 3/02, H01J 3/04 take precedence (see provisionally also

...
5/00 Details relating to vessels or to leading-in conductors common to two or more basic types of discharge tubes or lamps

5/02 . Vessels; Containers; Shields associated therewith; Vacuum locks
5/03 . Arrangements for preventing or mitigating effects of implosion of vessels or containers
5/04 . Vessels or containers characterised by the material thereof
5/06 . Vessels or containers specially adapted for operation at high tension, e.g. by improved potential distribution over surface of vessel
5/08 . provided with coatings on the walls thereof; Selection of materials for the coatings (luminescent coatings H01J 1/62)
5/10 . . . on internal surfaces
5/12 . . . Double-wall vessels or containers
5/125 . . . [with a gas tight space between both walls]
5/14 . . . Dismountable vessels or containers, e.g. for replacing cathode heater
5/16 . . . Optical or photographic arrangements structurally combined with the vessel

5/18 . . . Windows permeable to X-rays, gamma-rays, or particles
5/20 . . . Seals between parts of vessels
5/22 . . . Vacuum-tight joints between parts of vessel
5/24 . . . between insulating parts of vessel
5/26 . . . between insulating and conductive parts of vessel
5/28 . . . between conductive parts of vessel
5/30 . . . using packing-material, e.g. sealing-liquid or elastic insert
5/32 . . . Seals for leading-in conductors
5/34 . . . for an individual conductor (pinched-stem seals H01J 5/38; end-disc seals H01J 5/40; annular seals H01J 5/44)
5/36 . . . using intermediate part
5/38 . . . Pinched-stem or analogous seals
5/40 . . . End-disc seals, e.g. flat header
5/42 . . . using intermediate part
5/44 . . . Annular seals disposed between the ends of the vessel
5/46 . . . Leading-in conductors
5/48 . . . Means forming part of the tube or lamp for the purpose of supporting it
5/50 . . . Means forming part of the tube or lamps for the purpose of providing electrical connection to it
5/52 . . . directly applied to or forming part of the vessel
5/54 . . . supported by a separate part, e.g. base
5/56 . . . Shape of the separate part
5/565 . . . [Bases for circular lamps]
5/58 . . . Means for fastening the separate part to the vessel, e.g. by cement
5/60 . . . . . . for fastening by mechanical means
5/62 . . . . . . Connection of wires protruding from the vessel to connectors carried by the separate part

7/00 Details not provided for in the preceding groups and common to two or more basic types of discharge tubes or lamps

7/02 . Selection of substances for gas fillings; Specified operating pressure or temperature
7/04 . . . having one or more carbon compounds as the principal constituent
7/06 . . . having helium, argon, neon, krypton, or xenon as the principal constituent
7/08 . . . having a metallic vapour as the principal constituent
7/10 . . . mercury vapour
7/12 . . . vapour of an alkali metal
7/14 . . . Means for obtaining or maintaining the desired pressure within the vessel
7/16 . . . Means for permitting pumping during operation of the tube or lamp
7/18 . . . Means for absorbing or adsorbing gas, e.g. by gettering
7/183 . . . [Composition or manufacture of getters]
7/186 . . . [Getter supports]
7/20 . . . Means for producing, introducing, or replenishing gas or vapour during operation of the tube or lamp
7/22 . . . Tubulations therefor, e.g. for exhausting; Closures therefor
7/24 . . . Cooling arrangements; Heating arrangements; Means for circulating gas or vapour within the discharge space
Apparatus or processes specially adapted for the manufacture (installation, removal, maintenance) of electric discharge tubes, discharge lamps, or manufacture (regeneration) of non-emitting electrodes, focusing electrodes or anode conductors or bases

Manufacture or joining of vessels, leading-in conductors or bases

9/241 . . . [the vessel being for a flat panel display (H01J 9/261 takes precedence; flat discharge lamps H01J 9/248)]

9/242 . . . [Spacers between faceplate and backplate]

9/244 . . . [specially adapted for cathode ray tubes (H01J 9/241, H01J 9/26 take precedence)]

9/245 . . . [specially adapted for gas discharge tubes or lamps (H01J 9/241, H01J 9/26 take precedence)]

9/247 . . . [specially adapted for gas discharge lamps]

9/248 . . . [the vessel being flat]

9/26 . . . Sealing together parts of vessels

9/261 . . . [the vessel being for a flat panel display (for flat discharge lamps H01J 9/268)]

9/263 . . . [specially adapted for cathode-ray tubes (H01J 9/261 takes precedence)]

9/265 . . . [specially adapted for gas discharge tubes or lamps (H01J 9/261 takes precedence)]

9/266 . . . [specially adapted for gas discharge lamps]

9/268 . . . [the vessel being flat]

9/28 . . . Manufacture of leading-in conductors

9/30 . . . Manufacture of bases

9/32 . . . Sealing leading-in conductors

9/323 . . . [Sealing leading-in conductors into a discharge lamp or a gas-filled discharge device (for incandescent lamps H01K 3/20, joining glass to metal C03C 27/00)]

9/326 . . . [making pinched-stem or analogous seals]
vessel tubes with at least one main electrode outside the electrode inside the vessel; Gas-filled discharge tubes without any main circuits or methods for driving PDPs G09G 3/28 ( Alternating Current Plasma Display Panels )

current induction of the discharge, e.g. AC-PDPs

Gas-filled discharge tubes with alternating 11/00 Gas-filled discharge tubes with alternating current induction of the discharge, e.g. AC-PDPs [Alternating Current Plasma Display Panels] (circuits or methods for driving PDPs G09G 3/28); current induction of the discharge, e.g. AC-PDPs [Alternating Current Plasma Display Panels] (circuits or methods for driving PDPs G09G 3/28); Gas-filled discharge tubes without any main electrode inside the vessel; Gas-filled discharge tubes with at least one main electrode outside the vessel NOTES

1. When classifying in this group, classification is made in all appropriate places.

2. In this group, the following term is used with the meaning indicated:

- "main electrode" means any of a sustain electrode, scan electrode or address electrode.

11/10 AC-PDPs with at least one main electrode being out of contact with the plasma

11/12 with main electrodes provided on both sides of the discharge space

11/14 with main electrodes provided only on one side of the discharge space

11/16 with main electrodes provided inside on the side face of the spacers

11/18 containing a plurality of independent closed structures for containing the gas, e.g. plasma tube array [PTA] display panels

11/20 Constructional details

11/22 Electrodes, e.g. special shape, material or configuration

11/24 Sustain electrodes or scan electrodes

11/26 Address electrodes

11/28 Auxiliary electrodes, e.g. priming electrodes or trigger electrodes

11/30 Floating electrodes

11/32 Disposition of the electrodes

11/34 Vessels, containers or parts thereof, e.g. substrates

11/36 Spacers, barriers, ribs, partitions or the like

11/38 Dielectric or insulating layers

11/40 Layers for protecting or enhancing the electron emission, e.g. MgO layers

11/42 Fluorescent layers

11/44 Optical arrangements or shielding arrangements, e.g. filters, black matrices, light reflecting means or electromagnetic shielding means

11/46 Connecting or feeding means, e.g. leading-in conductors

11/48 Sealing, e.g. seals specially adapted for leading-in conductors

11/50 Filling, e.g. selection of gas mixture

11/52 Means for absorbing or adsorbing the gas mixture, e.g. by gettering

11/54 Means for exhausting the gas

13/00 Discharge tubes with liquid-pool cathodes, e.g. metal-vapour rectifying tubes

13/02 Details

13/04 Main electrodes; Auxiliary anodes

13/06 Cathodes

13/08 characterised by the material

13/10 Containers for the liquid pool; Arrangements or mounting thereof

13/12 Positioning or moving the cathode spot on the surface of the pool

13/14 Cooling, heating, circulating, filtering, or controlling level of the liquid

13/16 Anodes; Auxiliary anodes for maintaining the discharge

13/18 Cooling or heating of anodes

13/20 Control electrodes, e.g. grid (for igniting arrangements H01J 13/34)

13/22 Screens, e.g. for preventing or eliminating arcing-back

13/24 Vessels; Containers

13/24 [characterised by the material]

13/24 [characterised by the shape]

13/24 [Treatment of, or coating on interior parts of vessel]

13/24 [Envelope means outside vessel, i.e. screens, reflectors, filters]

13/26 Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors

13/263 [Leading-in conductors to the liquid electrode]

13/266 [Leading-in conductors to the anode]

13/28 Selection of substances for gas filling; Means for obtaining the desired pressure within the tube

13/30 Means for permitting pumping during operation of the tube

13/32 Cooling arrangements; Heating arrangements (for cathodes H01J 13/14; for anodes H01J 13/18)

13/34 Igniting arrangements

13/36 having resistive or capacitative igniter

13/38 having resistive igniter only

13/40 Igniting by movement of a solid electrode

13/405 [Interrupting contact with liquid cathode]

13/42 Igniting by movement of vessel as a whole, e.g. tilting

13/44 Devices for preventing or eliminating arcing-back

13/46 One or more circuit elements structurally associated with the tube
Gas-filled discharge tubes with gaseous cathodes, e.g. plasma cathode

- Details, e.g. electrode, gas filling, shape of vessel
- Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

Gas-filled discharge tubes with solid cathode

- Details of vacuum tubes of the types covered by group H01J 21/00
- Electron-emitting electrodes; Cathodes
- Thermionic cathodes
- characterised by the material
- with alkaline-earth metal oxides, or such oxides used in conjunction with reducing agents, as an emissive material
- with other metal oxides as an emissive material
- with metals or alloys as an emissive material
- with compounds having metallic conductive properties, e.g. lanthanum boride, as an emissive material
- Cathodes heated directly by an electric current
- Cathodes heated indirectly by an electric current; Cathodes heated by electron or ion bombardment
21/08 . . . with movable electrode or electrodes
21/04 . . . without control means, i.e. diodes
21/06 . . . having electrostatic control means only
21/065 . . . [Devices for short wave tubes]
21/08 . . . with movable electrode or electrodes
21/10 . . . with one or more immovable internal control electrodes, e.g. triode, pentode, octode

21/05 . . . [with microengineered cathode and control electrodes, e.g. Spindt-type]
21/12 . . . Tubes with variable amplification factor
21/14 . . . Tubes with means for concentrating the electron stream, e.g. beam tetrode
21/16 . . . with external electrostatic control means and with or without internal control electrodes
21/18 . . . having magnetic control means; having both magnetic and electrostatic control means
21/20 . . . Tubes with more than one discharge path; Multiple tubes, e.g. double diode, triode-hexode
21/22 . . . with movable electrode or electrodes
21/24 . . . with variable amplification factor
21/26 . . . with means for concentrating the electron stream
21/34 . . . Tubes with electrode system arranged or dimensioned so as to eliminate transit-time effect (with flat electrodes H01J 21/36)
21/36 . . . Tubes with flat electrodes, e.g. disc electrode

23/00 Details of transit-time tubes of the types covered by group H01J 25/00
23/005 . . . (Cooling methods or arrangements (H01J 23/033 takes precedence))
23/02 . . . Electrodes; Magnetic control means; Screens (associated with resonator or delay system H01J 23/16)
23/027 . . . Collectors
23/0275 . . . [Multistage collectors]
23/033 . . . Collector cooling devices
23/04 . . . Cathodes
23/05 . . . having a cylindrical emissive surface, e.g. cathodes for magnetrons
23/06 . . . Electron or ion guns
23/075 . . . Magnetron injection guns
23/08 . . . Focusing arrangements, e.g. for concentrating stream of electrons, for preventing spreading of stream
23/083 . . . Electrostatic focusing arrangements
23/087 . . . Magnetic focusing arrangements
23/0873 . . . [with at least one axial-field reversal along the interaction space, e.g. P.P.M. focusing]
23/0876 . . . [with arrangements improving the linearity and homogeneity of the axial field, e.g. field straightener]
23/09 . . . Electric systems for directing or deflecting the discharge along a desired path, e.g. E-type (focusing arrangements H01J 23/08)
23/10 . . . Magnet systems for directing or deflecting the discharge along a desired path, e.g. a spiral path (magnetic focusing arrangements H01J 23/08)
23/11 . . . Means for reducing noise (in electron or ion gun H01J 23/06)
23/12 . . . Vessels; Containers
23/14 . . . Leading-in arrangements; Seals therefor
23/15 . . . Means for preventing wave energy leakage structurally associated with tube leading-in arrangements, e.g. filters, chokes, attenuating devices
23/16 . . . Circuit elements, having distributed capacitance and inductance, structurally associated with the tube and interacting with the discharge

23/165 . . . [Manufacturing processes or apparatus therefore]

23/18 . . . Resonators

23/20 . . . Cavity resonators; Adjustment or tuning thereof

23/207 . . . Tuning of single resonator

23/213 . . . . Simultaneous tuning of more than one resonator, e.g. resonant cavities of a magnetron

23/22 . . . Connections between resonators, e.g. strapping for connecting resonators of a magnetron

23/24 . . . Slow-wave structures[, e.g. delay systems]

23/26 . . . Helical slow-wave structures; Adjustment thereof

23/27 . . . . Helix-derived slow-wave structures

23/28 . . . . Interdigital slow-wave structures; Adjustment thereof

23/30 . . . . Damping arrangements associated with slow-wave structures, e.g. for suppression of unwanted oscillations

23/34 . . . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

23/36 . . . Coupling devices having distributed capacitance and inductance, structurally associated with the tube, for introducing or removing wave energy

23/38 . . . to or from the discharge

23/40 . . . to or from the interaction circuit

23/42 . . . the interaction circuit being a helix or a helix-derived slow-wave structure (H01J 23/44 - H01J 23/48 take precedence)

23/44 . . . Rod-type coupling devices (H01J 23/46, H01J 23/48, H01J 23/54 take precedence)

23/46 . . . Loop coupling devices

23/48 . . . . for linking interaction circuit with coaxial lines; Devices of the coupled helices type (H01J 23/46 takes precedence)

23/50 . . . . the interaction circuit being a helix or derived from a helix (H01J 23/52 takes precedence)

23/52 . . . . the coupled helices being disposed coaxially around one another

23/54 . . . Filtering devices preventing unwanted frequencies or modes to be coupled to, or out of, the interaction circuit; Prevention of high frequency leakage in the environment

25/00 Transit-time tubes, e.g. klystrons, travelling-wave tubes, magnetrons (details of transit-time tubes H01J 23/00; particle accelerators H05H)

25/005 . . . [Gas-filled transit-time tubes]

25/02 . . . Tubes with electron stream modulated in velocity or density in a modulator zone and thereafter giving up energy in an inducing zone, the zones being associated with one or more resonators

25/025 . . . [with an electron stream following a helical path]

25/04 . . . Tubes having one or more resonators, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly density modulation, e.g. Heaff tube

25/06 . . . Tubes having only one resonator, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly velocity modulation, e.g. Lüdi-Klystron

25/08 . . . with electron stream perpendicular to the axis of the resonator

25/10 . . . Klystrons, i.e. tubes having two or more resonators, without reflection of the electron stream, and in which the stream is modulated mainly by velocity in the zone of the input resonator

25/11 . . . Extended interaction klystrons

25/12 . . . with pencil-like electron stream in the axis of the resonators

25/14 . . . with tube-like electron stream coaxial with the axis of the resonators

25/16 . . . with pencil-like electron stream perpendicular to the axis of the resonators

25/18 . . . with radial or disc-like electron stream perpendicular to the axis of the resonators

25/20 . . . having special arrangements in the space between resonators, e.g. resistive-wall amplifier tube, space-charge amplifier tube, velocity-jump tube

25/22 . . . Reflex klystrons, i.e. tubes having one or more resonators, with a single reflection of the electron stream, and in which the stream is modulated mainly by velocity in the modulator zone

25/24 . . . in which the electron stream is in the axis of the resonator or resonators and is pencil-like before reflection

25/26 . . . in which the electron stream is coaxial with the axis of the resonator or resonators and is tube-like before reflection

25/28 . . . in which the electron stream is perpendicular to the axis of the resonator or resonators and is pencil-like before reflection

25/30 . . . in which the electron stream is perpendicular to the axis of the resonator or resonators and is radial or disc-like before reflection

25/32 . . . Tubes with plural reflection, e.g. Coeterier tube

25/34 . . . Travelling-wave tubes; Tubes in which a travelling wave is simulated at spaced gaps

25/36 . . . Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and without magnet system producing an H-field crossing the E-field

25/38 . . . the forward travelling wave being utilised

25/40 . . . the backward travelling wave being utilised

25/42 . . . Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and with a magnet system producing an H-field crossing the E-field (with travelling wave moving completely around the electron space H01J 25/50)

25/44 . . . the forward travelling wave being utilised

25/46 . . . the backward travelling wave being utilised

25/48 . . . Tubes in which two electron streams of different velocities interact with one another, e.g. electron-wave tube

25/49 . . . Tubes using the parametric principle, e.g. for parametric amplification

25/50 . . . Magnetrons, i.e. tubes with a magnet system producing an H-field crossing the E-field (with travelling wave not moving completely around the electron space H01J 25/42; functioning with plural reflection or with reversed cyclotron action H01J 25/62, H01J 25/64)
25/52 . . with an electron space having a shape that does not prevent any electron from moving completely around the cathode or guide electrode
25/54 . . having only one cavity or other resonator, e.g. neutrode tubes
25/55 . . . . Coaxial cavity magnetrons
25/56 . . . . with interdigital arrangements of anodes, e.g. turbator tube
25/58 . . . . having a number of resonators; having a composite resonator, e.g. a helix
25/587 . . . . Multi-cavity magnetrons
25/593 . . . . Rising-sun magnetrons
25/60 . . with an electron space having a shape that prevents any electron from moving completely around the cathode or guide electrode; Linear magnetrons
25/61 . Hybrid tubes, i.e. tubes comprising a klystron section and a travelling-wave section
25/62 . Strophotrons, i.e. tubes with H-field crossing the E-field and functioning with plural reflection
25/64 . Turbine tubes, i.e. tubes with H-field crossing the E-field and functioning with reversed cyclotron action
25/66 . Tubes with electron stream crossing itself and thereby interacting or interfering with itself
25/68 . Tubes specially designed to act as oscillator with positive grid and retarding field, e.g. for Barkhausen-Kurz oscillators (with secondary emission H01J 25/74)
25/70 . . with resonator having distributed inductance with capacitance, e.g. Pintsch tube
25/72 . . in which a standing wave or a considerable part thereof is produced along an electrode, e.g. Clavier tube (with resonator having distributed inductance and capacitance H01J 25/70)
25/74 . Tubes specially designed to act as transit-time diode oscillators, e.g. monotron.
25/76 . Dynamic electron-multiplier tubes, e.g. Farnsworth multiplier tube, multipactor
25/78 . Tubes with electron stream modulated by deflection in a resonator

**27/00 Ion beam tubes (H01J 25/00, H01J 33/00, H01J 37/00 take precedence; particle accelerators H05H)**

27/02 . Ion sources; Ion guns { (for examination or processing discharge tubes H01J 37/08; ion sources, ion guns for particle spectrometer or separator tubes H01J 49/10; ion propulsion H03H 1/00) }

27/022 . . . {Details}
27/024 . . . . {Extraction optics, e.g. grids}
27/026 . . . . {Cluster ion sources}
27/028 . . . . {Negative ion sources}
27/04 . . using reflex discharge, e.g. Penning ion sources (electron bombardment ion sources H01J 27/08)

27/06 . . without applied magnetic field
27/08 . . using arc discharge
27/10 . . . Duoplasmatrons (; Duopigatrons)
27/12 . . . . provided with an expansion cup
27/14 . . . . Other arc discharge ion sources using an applied magnetic field
27/143 . . . . {Hall-effect ion sources with closed electron drift}

27/146 . . . . {End-Hall type ion sources, wherein the magnetic field confines the electrons in a central cylinder}
27/16 . . using high-frequency excitation, e.g. microwave excitation
27/18 . . with an applied axial magnetic field
27/20 . . using particle (beam) bombardment, e.g. ionisers
27/205 . . . {with electrons, e.g. electron impact ionisation, electron attachment}
27/22 . . Metal ion sources
27/24 . . using photo-ionisation, e.g. using laser beam
27/26 . . using surface ionisation, e.g. field effect ion sources, thernmic ion sources (H01J 27/20, H01J 27/24 take precedence)

**29/00 Details of cathode-ray tubes or of electron-beam tubes of the types covered by group H01J 31/00**

29/003 . {Arrangements for eliminating unwanted electromagnetic effects, e.g. demagnetisation arrangements, shielding coils (H01J 29/06, H01J 29/867 take precedence; demagnetisation in general H01F 13/00; circuit arrangements therefor H04N 9/20; screening of apparatus against electric or magnetic fields H05K 9/00) }
29/006 . {Arrangements for eliminating unwanted temperature effects}
29/02 . . Electrodes; Screens; Mounting, supporting, spacing or insulating thereof
29/021 . . . [arrangements for eliminating interferences in the tube (H01J 29/484 takes precedence)]
29/023 . . . {secondary-electron emitting electrode arrangements (secondary-emission tubes H01J 43/00) }
29/025 . . . {Mounting or supporting arrangements for grids (H01J 29/028 takes precedence) }
29/026 . . {Mounting or supporting arrangements for charge storage screens not deposited on the frontplate}
29/028 . . {Mounting or supporting arrangements for flat panel cathode ray tubes, e.g. spacers particularly relating to electrodes}
29/04 . . Cathodes
29/06 . . Screens for shielding; Masks interposed in the electron stream
29/07 . . . Shadow masks for colour television tubes
29/073 . . . . {Mounting arrangements associated with shadow masks}
29/076 . . . . {characterised by the shape or distribution of beam-passing apertures}
29/08 . . Electrodes intimately associated with a screen or from which an image or pattern is formed, picked-up, converted or stored, e.g. backing-plates for storage tubes or collecting secondary electrons
29/085 . . . {Anode plates, e.g. for screens of flat panel displays}
29/10 . . Screens on or from which an image or pattern is formed, picked up, converted or stored
29/12 . . acting as light valves by shutter operation, e.g. for eidophor
29/14 . . acting by discoloration, e.g. halide screen
29/16 . . . Incandescent screens
29/18 . . . Luminescent screens
29/182 . . . . . [acting upon the lighting-up of the luminescent material other than by the composition of the luminescent material, e.g. by infra red or UV radiation, heating or electric fields]

29/185 . . . . . [measures against halo-phenomena]

29/187 . . . . . [screens with more than one luminescent material (as mixtures for the treatment of the screens) (for several superimposed luminescent layers H01J 29/26; for adjacent dots or lines of different luminescent material H01J 29/32)]

29/20 . . . . . characterised by the luminescent material (for luminescent screens for X-ray purposes G21K 4/00)

29/22 . . . . . characterised by the binder or adhesive for securing the luminescent material to its support, e.g. vessel

29/225 . . . . . (photosensitive adhesive]

29/24 . . . . . Supports for luminescent material

29/26 . . . . . with superimposed luminescent layers

29/28 . . . . . with protective, conductive or reflective layers

29/30 . . . . . with luminescent material discontinuously arranged, e.g. in dots, in lines

29/32 . . . . . with adjacent dots or lines of different luminescent material, e.g. for colour television

29/322 . . . . . [with adjacent dots]

29/325 . . . . . [with adjacent lines]

29/327 . . . . . [Black matrix materials]

29/34 . . . . . provided with permanent marks or references

29/36 . . . . . Photoelectric screens; Charge-storage screens

29/38 . . . . . not using charge storage, e.g. photo-emissive screen, extended cathode [(electrodes using photo-emission in general H01J 1/34)]

29/385 . . . . . (Photocathodes comprising a layer which modified the wave length of impinging radiation (luminescent layers sensitive to UV and X-rays C09K 1/00, G21K 4/00)]

29/39 . . . . . Charge-storage screens [(H01J 29/395 takes precedence)]

29/395 . . . . . (charge-storage grids exhibiting triode effect)

29/41 . . . . . using secondary emission, e.g. for supericonoscope (electrodes using secondary emission in general H01J 1/32; secondary emission tubes H01J 43/00)]

29/413 . . . . . [for writing and reading of charge pattern on opposite sides of the target, e.g. for superorthicon]

29/416 . . . . . [with a matrix of electrical conductors traversing the target]

29/43 . . . . . using photo-emissive mosaic, e.g. for orthicon, for iconoscope

29/435 . . . . . [with a matrix of conductors traversing the target]

29/44 . . . . . exhibiting internal electric effects caused by particle radiation, e.g. bombardment-induced conductivity (particle detectors exhibiting internal electric effects G01T 1/20)

29/45 . . . . . exhibiting internal electric effects caused by electromagnetic radiation, e.g. photoconductive screen, photodielectric screen, photovoltaic screen (photodielectric layers for electrography G03G 5/00)]

29/451 . . . . . [with photosensitive junctions]

29/453 . . . . . [provided with diode arrays]

29/455 . . . . . [formed on a silicon substrate]

29/456 . . . . . [exhibiting no discontinuities, e.g. consisting of uniform layers]

29/458 . . . . . [pyroelectric targets; targets for infra-red or ultra-violet or X-ray radiations]

29/46 . . . . . Arrangements of electrodes and associated parts for generating or controlling the ray or beam, e.g. electron-optical arrangement [(transit time tubes H01J 23/00; H01J 25/00; X-ray tubes H01J 35/00; beam tubes for examining ions, e.g. electron or ion microscopes, or processing of objects or materials, e.g. electron or ion beam tubes H01J 37/04; electron multipliers H01J 43/04; handling of radiation or particles, e.g. focusing, deviating, not otherwise provided for G21K 1/00)]

29/462 . . . . . [arrangements for interrupting the beam during inoperative periods]

29/465 . . . . . [for simultaneous focalisation and deflection of ray or beam]

29/467 . . . . . [Control electrodes for flat display tubes, e.g. of the type covered by group H01J 31/23]

NOTE:
H01J 29/48 - H01J 29/51 take precedence over groups H01J 29/52 - H01J 29/68

29/48 . . . . . Electron guns

29/481 . . . . . [(Electron guns using field-emission, photo-emission, or secondary-emission electron source)]

29/482 . . . . . [(Electron guns using electron multiplication)]

29/484 . . . . . [(Eliminating deleterious effects due to thermal effects, electrical or magnetic fields; Preventing unwanted emission (H01J 29/481 and H01J 29/482 take precedence)]

29/485 . . . . . [(Construction of the gun or of parts thereof (H01J 29/481, H01J 29/482, H01J 29/484 and H01J 29/487 take precedence)]

29/487 . . . . . [(Replacing parts of the gun; Relative adjustment of the electrodes (H01J 29/481 and H01J 29/482 take precedence; vacuum locks H01J 29/565)]

29/488 . . . . . [(Schematic arrangements of the electrodes for beam forming; Place and form of the electrodes)]

29/50 . . . . . two or more guns in a single vacuum space, e.g. for plural-ray tube (H01J 29/51 takes precedence)

29/503 . . . . . [(Three or more guns, the axes of which lay in a common plane)]

29/506 . . . . . [(guns in delta or circular configuration)]

29/51 . . . . . [Arrangements for controlling convergence of a plurality of beams (by means of electric field only)]

29/52 . . . . . [Arrangements for controlling intensity of ray or beam, e.g. for modulation (H01J 29/467 takes precedence)]
29/525 . . . [Digitally controlled systems, e.g. Digisplay]
29/54 . . . Arrangements for centring ray or beam
   ((H01J 29/467 takes precedence))
29/56 . . . Arrangements for controlling cross-section of ray
   or beam; Arrangements for correcting aberration
   of beam, e.g. due to lenses ((H01J 29/467 takes
   precedence))
29/563 . . . [for controlling cross-section]
29/566 . . . [for correcting aberration]
29/58 . . . Arrangements for focusing or reflecting ray
   or beam ((H01J 29/467, H01J 29/585 take
   precedence))
29/585 . . . [in which the transit time of the electrons has
   to be taken into account]
29/60 . . . Mirrors
29/62 . . . Electrostatic lenses
29/622 . . . [producing fields exhibiting symmetry of
   revolution]
29/624 . . . [co-operating with or closely associated to
   an electron gun]
29/626 . . . [producing fields exhibiting axial symmetry,
   e.g. multipolar fields]
29/628 . . . [co-operating with or closely associated to
   an electron gun]
29/64 . . . Magnetic lenses
29/66 . . . using electromagnetic means only
29/68 . . . using permanent magnets only
29/70 . . . Arrangements for deflecting ray or beam
   ((H01J 29/467, H01J 29/525 take precedence))
29/701 . . . [Systems for correcting deviation or
   convergence of a plurality of beams by means
   of magnetic fields at least]
29/702 . . . [Convergence correction arrangements
   therefor]
29/703 . . . [Static convergence systems]
29/705 . . . [Dynamic convergence systems]
29/706 . . . [Deviation correction devices, i.e. having the
   same action on each beam]
29/707 . . . [Arrangements intimately associated with
   parts of the gun and co-operating with
   external magnetic excitation devices]
29/708 . . . [in which the transit time of the electrons has
   to be taken into account]
29/72 . . . along one straight line or along two
   perpendicular straight lines
29/74 . . . Deflecting by electric fields only
29/76 . . . Deflecting by magnetic fields only
29/762 . . . [using saddle coils or printed windings
   (coils per se H01F)]
29/764 . . . [using toroidal windings]
29/766 . . . [using a combination of saddle coils and
   toroidal windings]
29/768 . . . [using printed windings (printed windings
   in general H01F 27/2804; manufacturing
   printed coils per se H01F 41/04; printed
   circuits and apparatus or processes
   for manufacturing printed circuits in
   general H05K 1/00; e.g. H05K 1/16, and
   H05K 3/00)]
29/78 . . . along a circle, spiral or rotating radial line, e.g.
   for radar display
29/80 . . . Arrangements for controlling the ray or beam
   after passing the main deflection system, e.g. for
   post-acceleration or post-concentration, for colour
   switching ((H01J 29/701 takes precedence))
29/803 . . . [for post-acceleration or post-deflection, e.g.
   for colour switching]
29/806 . . . [Electron lens mosaics, e.g. fly's eye lenses,
   colour selection lenses]
29/81 . . . using shadow masks
29/82 . . . Mounting, supporting, spacing, or insulating
   electron-optical or ion-optical arrangements
29/823 . . . [around the neck of the tube]
29/826 . . . [Deflection arrangements]
29/84 . . . Traps for removing or diverting unwanted particles,
   e.g. negative ions, fringing electrons; Arrangements
   for velocity or mass selection
29/845 . . . [by means of magnetic systems]
29/86 . . . Vessels; Containers; Vacuum locks
29/861 . . . [Vessels or containers characterised by the form
   or the structure thereof]
29/862 . . . [of flat panel cathode ray tubes]
29/863 . . . [Vessels or containers characterised by the
   material thereof]
29/864 . . . [Spaceers between faceplate and backplate of
   flat panel cathode ray tubes]
29/865 . . . [Vacuum locks (for tubes for examining or
   processing of objects or materials, e.g. electron
   microscopes H01J 37/18)]
29/866 . . . [Devices for introducing a recording support
   into the vessel]
29/867 . . . [Means associated with the outside of the vessel
   for shielding, e.g. magnetic shields (screens for
   shielding inside the vessel H01J 29/06; magnetic
   shielding in general H05K 9/00)]
29/868 . . . [Screens covering the input or output face of
   the vessel, e.g. transparent anti-static coatings,
   X-ray absorbing layers]
29/88 . . . Arrangements for preventing or limiting effects of
   implosion of vessels or containers
29/89 . . . provided with coatings on the walls thereof;
   Selection of materials for the coatings
   ((H01J 29/868 and H01J 29/09 take precedence))
29/89 . . . Optical or photographic arrangements
   structurally combined (or co-operating) with
   the vessel ((H01J 29/866 and H01J 29/868 take
   precedence))
29/892 . . . [using fibre optics]
29/894 . . . [Arrangements combined with the vessel
   for the purpose of image projection on a
   screen (projection arrangements for image
   reproduction, e.g. using eidophor H04N 5/74)]
29/896 . . . [Anti-reflection means, e.g. eliminating glare
   due to ambient light]
29/898 . . . [Spectral filters]
29/90 . . . Leading-in arrangements; Seals therefor
29/92 . . . Means forming part of the tube for the purpose of
   providing electrical connection to it
29/925 . . . [High voltage anode feedthrough connectors for
   display tubes]
29/94 . . . Selection of substances for gas fillings; Means for
   obtaining or maintaining the desired pressure
   within the tube, e.g. by getting (exhausting, degassing,
   gettering of electric discharge tubes in general
   H01J 9/38)]
Cathode ray tubes; Electron beam tubes

31/00

(H01J 25/00; H01J 33/00; H01J 35/00; H01J 37/00 take precedence; details of cathode ray tubes or of electron beam tubes H01J 29/00)

31/02

having one or more output electrodes which may be impacted selectively by the ray or beam, and onto, from, or over which the ray or beam may be deflected or de-focused (pulse counting circuits therewith H03K 29/006)

31/04

with only one or two output electrodes (with only two electrically independant groups or electrodes)

31/06

with more than two output electrodes, e.g. for multiple switching or counting

31/065

for electrophotography, for transferring a charge pattern through the faceplate (leading-in arrangements H01J 29/90; Lenard tubes H01J 33/00; electrophotography or photo-electrophotography per se G03C)

31/08

having a screen on or from which an image or pattern is formed, picked up, converted, or stored

31/10

Image or pattern display tubes, i.e. having electrical input and optical output; Flying-spot tubes for scanning purposes

31/12

with luminescent screen

31/121

tubes for oscillography (colour display tubes H01J 31/20; cathode ray oscillography G01R 13/20)

31/122

Direct viewing storage tubes without storage grid (with storage grid H01J 31/18)

31/123

Flat display tubes

31/124

using electron beam scanning

31/125

(provided with control means permitting the electron beam to reach selected parts of the screen, e.g. digital selection)

31/126

using line sources

31/127

using large area or array sources, i.e. essentially a source for each pixel group

31/128

(provided with control means permitting the electron beam to reach selected parts of the screen, e.g. digitally controlled display tubes (H01J 31/12) takes precedence)

31/14

Magic-eye or analogous tuning indicators (mounting of visual indicators in a radio set H03J 1/04; circuits for timing indicators H03J 3/14)

31/15

with ray or beam selectively directed to luminescent anode segments (printing by application of radiation B41J 29/47)

31/16

with mask carrying a number of selectively displayable signs, e.g. charactor, numeroscope (tubes with a mask carrying a matrix of openings, a selection of which permits a sign to be displayed H01J 31/128)

31/18

with image written by a ray or beam on a grid-like charge-accumulating screen, and with a ray or beam passing through and influenced by this screen before striking the luminescent screen, e.g. direct-view storage tube (charge storage grids exhibiting triode effect H01J 29/395)

31/20

for displaying images or patterns in two or more colours (circuits for colour television H04N 9/16; H04N 9/28)

31/201

using a colour-selection electrode

31/203

with more than one electron beam

31/205

with three electron beams in delta configuration

31/206

with three coplanar electron beams

31/208

using variable penetration depth of the electron beam in the luminescent layer, e.g. penetrons

31/22

for stereoscopic displays

31/24

with screen acting as light valve by shutter operation, e.g. eidophor (projection arrangements for image reproduction, e.g. using eidophor H04N 5/43)

31/26

Image pick-up tubes having an input of visible light and electric output (tubes without defined electron beams and having a light ray scanning photo-emissive screen H01J 40/20)

31/265

with light spot scanning

31/28

with electron ray scanning the image screen (H01J 31/283, H01J 31/286 take precedence)

31/283

with a target comprising semiconductor junctions

31/286

(correlater tubes)

31/30

having regulation of screen potential at anode potential, e.g. iconoscope

31/32

Tubes with image amplification section, e.g. image-iconoscope, supericonoscope

31/34

having regulation of screen potential at cathode potential, e.g. orthicon

31/36

Tubes with image amplification section, e.g. image-orthicon

31/38

Tubes with photoconductive screen, e.g. vidicon

31/40

having grid-like image screen through which the electron ray passes and by which the ray is influenced before striking the output electrode, i.e. having "triode action"

31/42

with image screen generating a composite electron beam which is deflected as a whole past a stationary probe to simulate a scanning effect, e.g. Farnsworth pick-up tube

31/44

Tubes with image amplification section

31/46

Tubes in which electrical output represents both intensity and colour of image (colour television cameras with only one tube H04N 9/07)

31/48

Tubes with amplification of output effected by electron multiplier arrangements within the vacuum space

31/49

Pick-up adapted for an input of electromagnetic radiation other than visible light and having an electric output, e.g. for an input of X-rays, for an input of infra-red radiation
35/06 . . . Cathodes

**WARNING**

Group H01J 35/06 is impacted by reclassification into groups H01J 35/064 and H01J 35/066.

Groups H01J 35/06 and H01J 35/064 should be considered in order to perform a complete search.

35/064 . . . (Details of the emitter, e.g. material or structure (H01J 35/065 takes precedence))

**WARNING**

Group H01J 35/064 is incomplete pending reclassification of documents from group H01J 35/06.

Groups H01J 35/06 and H01J 35/064 should be considered in order to perform a complete search.

35/065 . . . (Field emission, photo emission or secondary emission cathodes)

35/066 . . . (Details of electron optical components, e.g. cathode cups)

**WARNING**

Group H01J 35/066 is incomplete pending reclassification of documents from group H01J 35/06.

Groups H01J 35/06 and H01J 35/066 should be considered in order to perform a complete search.

35/08 . . . Anodes; Anti cathodes

**WARNING**

Group H01J 35/08 is impacted by reclassification into groups H01J 35/112 and H01J 35/116.

Groups H01J 35/08 and H01J 35/112 and H01J 35/116 should be considered in order to perform a complete search.

35/10 . . . Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes

35/101 . . . (Arrangements for rotating anodes, e.g. supporting means, means for greasing, means for sealing the axle or means for shielding or protecting the driving)

**WARNING**

Group H01J 35/101 is impacted by reclassification into groups H01J 35/1017, H01J 35/1024 and H01J 35/104.

All groups listed in this Warning should be considered in order to perform a complete search.

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**Details**

- H01J 35/101
- H01J 35/102
- H01J 35/104
- H01J 35/106
- H01J 35/112
- H01J 35/116
- H01J 35/06
- H01J 35/064
- H01J 35/066
- H01J 35/08
- H01J 35/1017
- H01J 35/1024
- H01J 35/104

**Groups**

- H01J 35/02
- H01J 35/04
- H01J 35/06
- H01J 35/08
- H01J 35/101
- H01J 35/102
- H01J 35/104
- H01J 35/106
- H01J 35/112
- H01J 35/116

**Omissions**

- H01J 35/116
### H01J 35/1017
- **{Bearings for rotating anodes}**

  **WARNING**
  Groups H01J 35/1017, H01J 35/1024 and H01J 35/104 are incomplete pending recategorization of documents from group H01J 35/101. Groups H01J 35/101, H01J 35/1017, H01J 35/1024 and H01J 35/104 should be considered in order to perform a complete search.

### H01J 35/1024
- **{Rolling bearings}**

### H01J 35/103
- **{Magnetic bearings}**

### H01J 35/104
- **{Fluid bearings}**

### H01J 35/105
- **{Cooling of rotating anodes, e.g. heat emitting layers or structures}**

  **WARNING**
  Group H01J 35/105 is impacted by recategorization into group H01J 35/107. Groups H01J 35/105 and H01J 35/107 should be considered in order to perform a complete search.

### H01J 35/106
- **{Active cooling, e.g. fluid flow, heat pipes}**

  **WARNING**
  Group H01J 35/106 is impacted by recategorization into group H01J 35/107. Groups H01J 35/106 and H01J 35/107 should be considered in order to perform a complete search.

### H01J 35/107
- **{Cooling of the bearing assemblies}**

  **WARNING**
  Group H01J 35/107 is incomplete pending recategorization of documents from groups H01J 35/105 and H01J 35/106. Groups H01J 35/105, H01J 35/106 and H01J 35/107 should be considered in order to perform a complete search.

### H01J 35/108
- **{Substrates for and bonding of emissive target, e.g. composite structures}**

### H01J 35/112
- **{Non-rotating anodes (H01J 35/12 takes precedence)}**

  **WARNING**
  Group H01J 35/112 is incomplete pending recategorization of documents from group H01J 35/08. Groups H01J 35/08 and H01J 35/112 should be considered in order to perform a complete search.

### H01J 35/116
- **{Transmissive anodes (acting as a window H01J 35/186)}**

  **WARNING**
  Group H01J 35/116 is incomplete pending recategorization of documents from group H01J 35/08. Groups H01J 35/08 and H01J 35/116 should be considered in order to perform a complete search.

### H01J 35/12
- **{Cooling non-rotary anodes}**

  **WARNING**
  Group H01J 35/12 is impacted by recategorization into group H01J 35/13. Groups H01J 35/12 and H01J 35/13 should be considered in order to perform a complete search.

### H01J 35/13
- **{Active cooling, e.g. fluid flow, heat pipes}**

  **WARNING**
  Group H01J 35/13 is incomplete pending recategorization of documents from group H01J 35/12. Groups H01J 35/12 and H01J 35/13 should be considered in order to perform a complete search.

### H01J 35/14
- **{Arrangements for concentrating, focusing, or directing the cathode ray}**

  **WARNING**
  Group H01J 35/14 is impacted by recategorization into groups H01J 35/147 and H01J 35/153. Groups H01J 35/14 and H01J 35/147 and H01J 35/153 should be considered in order to perform a complete search.

### H01J 35/147
- **{Spot size control}**

  **WARNING**
  Group H01J 35/147 is incomplete pending recategorization of documents from group H01J 35/14. Groups H01J 35/14 and H01J 35/147 should be considered in order to perform a complete search.

### H01J 35/153
- **{Spot position control}**

  **WARNING**
  Group H01J 35/153 is incomplete pending recategorization of documents from group H01J 35/14. Groups H01J 35/14 and H01J 35/153 should be considered in order to perform a complete search.

### H01J 35/16
- **{Vessels; Containers; Shields associated therewith}**

### H01J 35/165
- **{Joining connectors to the tube}**
Discharge tubes with provision for introducing objects or material to be exposed to the discharge, e.g. for the purpose of examination or processing thereof (H01J 33/00, H01J 40/00, H01J 41/00, H01J 47/00, H01J 49/00 take precedence)
Vacuum locks (vacuum locks for electron-beam tubes in general H01J 29/865)

Means for transferring objects between different enclosures of different pressure or atmosphere (introducing the objects H01J 37/18)

Means for adjusting the focus (adjusting the focus while observing the image by photographic or optical means H01J 37/22; means for observing the object or the point of impact on the object in tubes for the localised treatment of materials H01J 37/3005)

Optical or photographic arrangements associated with the tube (using a CRT for the display of the image in a scanning electron microscope H01J 37/28; observing the object or the point of impact on the object in tubes for the localised treatment of materials H01J 37/3007)

Image processing arrangements associated with the tube (image data processing or generation, in general G06T)

Luminescent screens or photographic plates for imaging (photosensitive materials for photographic purposes G03C); Apparatus specially adapted therefor, e.g. cameras, TV-cameras, photographic equipment, exposure control; Optical subsystems specially adapted therefor, e.g. microscopes for observing image on luminescent screen

Optical arrangements for illuminating the object; optical arrangements for collecting light from the object

Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for high voltage power supply or regulation circuits (components H01J 37/248)

Filament heating power supply or regulation circuits (H01J 37/241 takes precedence)

Beam current control or regulation circuits (H01J 37/241 takes precedence)

Detectors; Associated components or circuits therefor

Components associated with high voltage supply (means for measuring the high voltage per se G01R 15/00)

Tubes for spot-analysing by electron or ion beams; Microanalysers

using scanning beams

Electron or ion microscopes; Electron or ion diffraction tubes

[Details]

Contrast, resolution or power of penetration

[Controlling the tube; circuit arrangements adapted to a particular application not otherwise provided, e.g. bright-field-dark-field illumination]
37/32009 . . . (Arrangements for generation of plasma specially adapted for examination or treatment of objects, e.g. plasma sources (plasma generation in general H05H 1/24))

37/32018 . . . [Glow discharge]
37/32027 . . . [DC powered]
37/32036 . . . [AC powered]
37/32045 . . . [Circuits specially adapted for controlling the glow discharge]
37/32055 . . . [Arc discharge]
37/32064 . . . [Circuits specially adapted for controlling the arc discharge (for plasma torches H01H 1/36)]
37/32073 . . . [Corona discharge]
37/32082 . . . [Radio frequency generated discharge (H01J 37/32357, H01J 37/32366, H01J 37/32394 and H01J 37/32403 take precedence)]
37/32091 . . . [the radio frequency energy being capacitively coupled to the plasma]
37/321 . . . . . . [the radio frequency energy being inductively coupled to the plasma]
37/3211 . . . . . . [Antennas, e.g. particular shapes of coils]
37/32119 . . . . . . [Windows]
37/32128 . . . . . . [using particular waveforms, e.g. polarised waves]
37/32137 . . . . . . [controlling of the discharge by modulation of energy]
37/32146 . . . . . . [Amplitude modulation, includes pulsing]
37/32155 . . . . . . [Frequency modulation]
37/32165 . . . . . . [Plural frequencies]
37/32174 . . . . . . [Circuits specially adapted for controlling the RF discharge]
37/32183 . . . . . . [Matching circuits, impedance matching circuits per se H03H 7/38 and H03H 7/40]
37/32192 . . . . . . [Microwave generated discharge (H01J 37/32357, H01J 37/32366, H01J 37/32394, H01J 37/32403 take precedence)]
37/32201 . . . . . . [Generating means]
37/32211 . . . . . . [Means for coupling power to the plasma]
37/3222 . . . . . . . [Antennas]
37/32229 . . . . . . . [Waveguides]
37/32238 . . . . . . . [Windows]
37/32247 . . . . . . . [Resonators]
37/32256 . . . . . . . [Tuning means]
37/32266 . . . . . . . [Means for controlling power transmitted to the plasma]
37/32275 . . . . . . . [Microwave reflectors]
37/32284 . . . . . . . [Means for controlling or selecting resonance mode]
37/32293 . . . . . . . [using particular waveforms, e.g. polarised waves]
37/32302 . . . . . . . [Plural frequencies]
37/32311 . . . . . . . [Circuits specially adapted for controlling the microwave discharge]
37/32321 . . . . . . . [Discharge generated by other radiation (H01J 37/32055, H01J 37/32073, H01J 37/32082, H01J 37/32192, H01J 37/32348 take precedence)]
37/3233 . . . . . . . [using charged particles]
37/32339 . . . . . . . [using electromagnetic radiation]
37/32348 . . . . . . . [Dielectric barrier discharge]
37/32357 . . . . . . . [Generation from the workpiece, e.g. down-stream]
37/32366 . . . . . . . [Localised processing]
37/32376 . . . . . . . [Scanning across large workpieces]
37/32385 . . . . . . . [Treating the edge of the workpieces]
37/32394 . . . . . . . [Treating interior parts of workpieces]
37/32403 . . . . . . . [Treating multiple sides of workpieces, e.g. 3D workpieces]
37/32412 . . . . . . . [Plasma immersion ion implantation]
37/32422 . . . . . . . [Arrangement for selecting ions or species in the plasma]
37/32431 . . . . . . . [Constructional details of the reactor]
37/3244 . . . . . . . . . [Gas supply means]
37/32449 . . . . . . . . . [Gas control, e.g. control of the gas flow]
37/32458 . . . . . . . [Vessel]
37/32467 . . . . . . . [Material]
37/32477 . . . . . . . . . [characterised by the means for protecting vessels or internal parts, e.g. coatings]
37/32486 . . . . . . . . . [Means for reducing recombination coefficient]
37/32495 . . . . . . . . . [Means for protecting the vessel against plasma]
37/33 . . . . . . . . . . . [Means for preventing sputtering of the vessel]
37/32513 . . . . . . . . . [Sealing means, e.g. sealing between different parts of the vessel]
37/32522 . . . . . . . . . [Temperature]
37/32532 . . . . . . . . . [Electrodes]
37/32541 . . . . . . . . . [Shape]
37/3255 . . . . . . . . . . . [Material]
37/32559 . . . . . . . . . [Protection means, e.g. coatings]
37/32568 . . . . . . . . . [Relative arrangement or disposition of electrodes; moving means]
37/32577 . . . . . . . . . [Electrical connecting means]
37/32587 . . . . . . . . . [Triode systems]
37/32596 . . . . . . . . . [Hollow cathodes]
37/32605 . . . . . . . . . [Removable or replaceable electrodes or electrode systems]
37/32614 . . . . . . . . . [Consumable cathodes for arc discharge]
37/32623 . . . . . . . . . [Mechanical discharge control means]
37/32633 . . . . . . . . . [Baffles]
37/32642 . . . . . . . . . [Focus rings]
37/32651 . . . . . . . . . [Shields, e.g. dark space shields, Faraday shields]
37/3266 . . . . . . . . . [Magnetic control means]
37/32669 . . . . . . . . . [Particular magnets or magnet arrangements for controlling the discharge]
37/32678 . . . . . . . . . [Electron cyclotron resonance]
37/32688 . . . . . . . . . [Multi-cusp fields]
37/32697 . . . . . . . . . [Electrostatic control]
37/32706 . . . . . . . . . [Polarising the substrate]
H01J

37/32715 . . . . . . . [Workpiece holder]
37/32724 . . . . . . . [Temperature]
37/32733 . . . . . . . [Means for moving the material to be treated]
37/32743 . . . . . . . [for introducing the material into processing chamber]
37/32752 . . . . . . . [for moving the material across the discharge]
37/32761 . . . . . . . [Continuous moving]
37/32777 . . . . . . . [of continuous material]
37/32779 . . . . . . . [of batches of workpieces]
37/32788 . . . . . . . [for extracting the material from the process chamber]
37/32798 . . . . . . . [Further details of plasma apparatus not provided for in groups H01J 37/3244 - H01J 37/3288; special provisions for cleaning or maintenance of the apparatus]
37/32807 . . . . . . . [Construction (includes replacing parts of the apparatus)]
37/32816 . . . . . . . [Pressure]
37/32825 . . . . . . . [Working under atmospheric pressure or higher]
37/32834 . . . . . . . [Exhausting]
37/32844 . . . . . . . [Treating effluent gases]
37/32853 . . . . . . . [Hygiene]
37/32862 . . . . . . . [In situ cleaning of vessels and/or internal parts]
37/32871 . . . . . . . [Means for trapping or directing unwanted particles]
37/3288 . . . . . . . [Maintenance]
37/32889 . . . . . . . [Connection or combination with other apparatus]
37/32899 . . . . . . . [Multiple chambers, e.g. cluster tools]
37/32908 . . . . . . . [Utilities]
37/32917 . . . . . . . [Plasma diagnostics]
37/32926 . . . . . . . [Software, data control or modelling]
37/32935 . . . . . . . [Monitoring and controlling tubes by information coming from the object and/or discharge]
37/32944 . . . . . . . [Arc detection]
37/32954 . . . . . . . [Electron temperature measurement]
37/32963 . . . . . . . [End-point detection]
37/32972 . . . . . . . [Spectral analysis]
37/32981 . . . . . . . [Gas analysis]
37/3299 . . . . . . . [Feedback systems]
37/34 . . . . . . . operating with cathodic sputtering (H01J 37/36 takes precedence; methods of cathodic sputtering C23C 14/34)]
37/3402 . . . . . . . [using supplementary magnetic fields]
37/3405 . . . . . . . [Magnetron sputtering]
37/3408 . . . . . . . [Planar magnetron sputtering]
37/3411 . . . . . . . [Constructional aspects of the reactor]
37/3414 . . . . . . . [Targets]
37/3417 . . . . . . . [Arrangements]
37/342 . . . . . . . [Hollow targets]
37/3423 . . . . . . . [Shape]
37/3426 . . . . . . . [Material]
37/3429 . . . . . . . [Plural materials]
37/3432 . . . . . . . [Target-material dispenser]
37/3435 . . . . . . . [Target holders (includes backing plates and endblocks)]
37/3438 . . . . . . . [Electrodes other than cathode]
37/3441 . . . . . . . [Dark space shields]
37/3344 . . . . . . . [Associated circuits]
37/3347 . . . . . . . [Collimators, shutters, apertures]
37/3345 . . . . . . . [Magnet arrangements in particular for cathodic sputtering apparatus (material of magnets or magnets in general H01F 1/00, H01F 7/00)]
37/33452 . . . . . . . [Magnet distribution]
37/3355 . . . . . . . [Movable magnets]
37/3358 . . . . . . . [Electromagnets in particular for cathodic sputtering apparatus (electromagnets in general H01F 7/06)]
37/3361 . . . . . . . [Means for shaping the magnetic field, e.g. magnetic shunts]
37/3364 . . . . . . . [Operating strategies]
37/3367 . . . . . . . [Pulsed operation, e.g. HIPIMS]
37/3347 . . . . . . . [Thickness uniformity of coated layers or desired profile of target erosion]
37/3373 . . . . . . . [Composition uniformity or desired gradient]
37/3376 . . . . . . . [Testing and control]
37/33479 . . . . . . . [Detecting exhaustion of target material]
37/33482 . . . . . . . [Detecting or avoiding eroding through target]
37/33485 . . . . . . . [Means for avoiding target poisoning]
37/33488 . . . . . . . [Constructional details of particle beam apparatus not otherwise provided for, e.g. arrangement, mounting, housing, environment; special provisions for cleaning or maintenance of the apparatus]
37/33491 . . . . . . . [Manufacturing of targets]
37/33494 . . . . . . . [Adaptation to extreme pressure conditions]
37/33497 . . . . . . . [Temperature of target]
37/36 . . . . . . . . . . . for cleaning surfaces while plating with ions of materials introduced into the discharge, e.g. introduced by evaporation [(condensing of electrically charged vapour onto a surface for covering materials with metals C23C 14/32)]
40/00 . . . . . . . Photoelectric discharge tubes not involving the ionisation of a gas (H01J 49/00 takes precedence)
40/02 . . . . . . . Details
40/04 . . . . . . . Electrodes
40/06 . . . . . . . Photo-emissive cathodes
40/08 . . . . . . . Magnetic means for controlling discharge
40/10 . . . . . . . Selection of substances for gas fillings
40/12 . . . . . . . One or more circuit elements structurally associated with the tube
40/14 . . . . . . . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
40/16 . . . . . . . having photo-emissive cathode, e.g. alkaline photoelectric cell (operating with secondary emission H01J 43/00)
40/18 . . . . . . . with luminescent coatings for influencing the sensitivity of the tube, e.g. by converting the input wavelength
40/20 . . . . . . . wherein a light-ray scans a photo-emissive screen
41/00 . . . . . . . Discharge tubes for measuring pressure of introduced gas [or for detecting presence of gas]; Discharge tubes for evacuation by diffusion of ions
41/02 . . . . . . . Discharge tubes for measuring pressure of introduced gas [or for detecting presence of gas]
41/04 . . . . . . . with ionisation by means of thermionic cathodes
41/06 . . . . . . . with ionisation by means of cold cathodes
44/08 . . . with ionisation by means of radioactive substances, e.g. alphas, neutrons, or protons
44/10 . . . of particle spectrometer type (particle spectrometers see H01J 49/00)
44/12 . . . Discharge tubes for evacuating by diffusion of ions, using gettering substances
44/14 . . . with ionisation by means of thermonic cathodes
44/16 . . . using gettering substances
44/18 . . . with ionisation by means of cold cathodes
44/20 . . . using gettering substances

43/00 Secondary-emission tubes; Electron-multiplier tubes (dynamic electron-multiplier tubes H01J 25/76)
43/02 . . . Tubes in which one or a few electrodes are secondary-electron emitting electrodes
43/025 . . . [Circuits therefor]
43/04 . . . Electron multipliers (if forming part of electron gun H01J 30/23)
43/045 . . . [Position sensitive electron multipliers]
43/06 . . . Electrode arrangements
43/08 . . . Cathode arrangements (photo-emissive electrodes H01J 1/34, H01J 1/35; construction of photo cathodes H01J 40/00, H01J 40/16, H01J 47/00, H01J 49/08)
43/10 . . . Dynodes (H01J 43/24, H01J 43/26 take precedence)
43/12 . . . Anode arrangements
43/14 . . . Control of electron beam by magnetic field
43/16 . . . Electrode arrangements using essentially one dynode
43/18 . . . Electrode arrangements using essentially more than one dynode
43/20 . . . Dynodes consisting of sheet material, e.g. plane, bent
43/22 . . . Dynodes consisting of electron-permeable material, e.g. foil, grid, tube, venetian blind
43/24 . . . Dynodes having potential gradient along their surfaces
43/243 . . . [Dynodes consisting of a piling-up of channel-type dynode plates]
43/246 . . . [Microchannel plate (MCP) (image amplification tubes using MCP H01J 31/507)]
43/26 . . . Box dynodes
43/28 . . . Vessels [wall of the tube]; Windows; Screens; Suppressing undesired discharges or currents
43/30 . . . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

45/00 Discharge tubes functioning as thermionic generators [(structural combination of fuel element with thermoelectric element G21C 3/40; nuclear power plants using thermionic converters G21D 7/04; structural combination of a radioactive source with a thermionic converter, e.g. radioisotope batteries G21H 1/10; generators in which thermal or kinetic energy is converted into electrical energy by ionisation of a fluid and removal of the charge therefrom H02N 3/00)]
47/00 Tubes for determining the presence, intensity, density or energy of radiation or particles (discharge tubes using igniting by associated radioactive materials or fillings, e.g. current stabilising tubes H01J 17/32; photoelectric discharge tubes not involving the ionisation of a gas H01J 40/00; discharge tubes for measuring the pressure, partial pressure of introduced gas or for detecting presence of gas H01J 41/02; ionisation chambers using a solid dielectric G01T 3/008)
47/001 . . . [Details]
47/002 . . . [Vessels or containers]
47/003 . . . [using tissue-equivalent materials]
47/004 . . . [Windows permeable to X-rays, gamma-rays, or particles (windows for discharge tubes with provision for emergence of electrons or ions from the vessel H01J 33/04; windows for X-ray tubes H01J 35/18)]
47/005 . . . [Gas fillings (H01J 47/12 takes precedence; maintaining the desired pressure within the tube)]
47/006 . . . [Tissue equivalent gas fillings]
47/007 . . . [Flash detectors]
47/008 . . . [Drift detectors]
47/002 . . . Ionisation chambers
47/022 . . . [Calibration thereof]
47/024 . . . [Well-type ionisation chambers]
47/026 . . . [Gas flow ionisation chambers]
47/028 . . . [using a liquid dielectric]
47/04 . . . Capacitive ionisation chambers, e.g. the electrodes of which are used as electrometers
47/06 . . . Proportional counter tubes
47/062 . . . [Multiwire proportional counter tubes]
47/065 . . . [Well-type proportional counter tubes]
47/067 . . . [Gas flow proportional counter tubes]
47/08 . . . Geiger-Müller counter tubes (gas filling with very short deionisation times H01J 17/64, H01T)
47/10 . . . Spark counters (H01J 47/14 takes precedence; spark gaps H01T)
47/12 . . . Neutron detector tubes, e.g. BF₃ tubes
47/1205 . . . [using nuclear reactions of the type (n, alpha) in solid materials, e.g. Boron-10 (n, alpha) Hydrogen-3]
47/1211 . . . [Ionisation chambers]
47/1216 . . . [Gamma compensated]
47/1222 . . . [Proportional counters]
47/1227 . . . [Fission detectors]
47/1233 . . . [Ionisation chambers]
47/1238 . . . [Counters]
47/1244 . . . [Multiwire counters]
47/125 . . . [Helium ionisation detectors]
47/1255 . . . [Ionisation chambers]
47/1261 . . . [Counters]
47/1266 . . . [Multi-wire counters]
47/1272 . . . [BF₃ tubes]
47/1277 . . . [Light-nuclei-recoil ionisation detectors, e.g. using protons, alpha-particles]
47/1283 . . . [Ionisation chambers]
47/1288 . . . [Counters]
47/1294 . . . [Multi-wire counters]
H01J

47/14 . Parallel electrode spark or streamer chambers; Wire spark or streamer chambers \{(circuit arrangements with multi-wire or parallel-plate chambers for recording of movements or tracks of particles G01T 5/12)\}

47/16 . characterised by readout of each individual wire

47/18 . . the readout being electrical \((H01J 47/20\) takes precedence)

47/20 . . the readout employing electrical or mechanical delay lines, e.g. magnetostriective delay lines

47/22 . . characterised by another type of readout

47/24 . . the readout being acoustical

47/26 . . the readout being optical

49/00 Particle spectrometers or separator tubes

**NOTE**

In classifying particle separators, no distinction is made between spectrometry and spectrography, the difference being only in the manner of detection which in the first case is electrical and in the second case is by means of a photographic film.

49/0004 . [Imaging particle spectrometry]

49/0009 . [Calibration of the apparatus]

49/0013 . [Miniaturised spectrometers, e.g. having smaller than usual scale, integrated conventional components]

49/0018 . . [Microminiaturised spectrometers, e.g. chip-integrated devices, MicroElectro-Mechanical Systems [MEMS]]

49/0022 . [Portable spectrometers, e.g. devices comprising independent power supply, constructional details relating to portability (small scale devices per se \((H01J 49/0013\) and \((H01J 49/0018)\)]

49/0027 . [Methods for using particle spectrometers]

49/0031 . . [Step by step routines describing the use of the apparatus \((H01J 49/0081\) takes precedence)]

49/0036 . . [Step by step routines describing the handling of the data generated during a measurement (recognising patterns in signals G06K 9/00496)]

49/004 . [Combinations of spectrometers, tandem spectrometers, e.g. MS/MS, MSn]

49/0045 . . [characterised by the fragmentation or other specific reaction]

49/005 . . [by collision with gas, e.g. by introducing gas or by accelerating ions with an electric field]

49/0054 . . [by an electron beam, e.g. electron impact dissociation, electron capture dissociation]

49/0059 . . [by a photon beam, photo-dissociation]

49/0063 . . [by applying a resonant excitation voltage]

49/0068 . . [by collision with a surface, e.g. surface induced dissociation]

49/0072 . . [by ion/ion reaction, e.g. electron transfer dissociation, proton transfer dissociation]

49/0077 . . [specific reactions other than fragmentation]

49/0081 . [Tandem in time, i.e. using a single spectrometer]

49/0086 . [Accelerator mass spectrometers]

49/009 . [Spectrometers having multiple channels, parallel analysis]

49/0095 . [Particular arrangements for generating, introducing or analyzing both positive and negative analyte ions (ion/ion reactions \((H01J 49/0072)\)]

49/02 . Details

49/022 . [Circuit arrangements, e.g. for generating deviation currents or voltages (regulating electric or magnetic variables in general, e.g. current, magnetic field G05F); Components associated with high voltage supply (high voltage supply per se \((H01J 49/02)\)]

49/025 . [Detectors specially adapted to particle spectrometers (data acquisition \((H01J 49/0036;\) detectors per se \((G01T\) e.g. \((G01T 1/28, G01T 1/29)\)]

49/027 . . . [detecting image current induced by the movement of charged particles \((H01J 49/38\) takes precedence)]

49/04 . [Arrangements for introducing or extracting samples to be analysed, e.g. vacuum locks; Arrangements for external adjustment of electron- or ion-optical components]

49/0404 . . . [Capillaries used for transferring samples or ions (electrospray nozzles \((H01J 49/167)\)]

49/0409 . . [Sample holders or containers (containers for retaining a material to be analyzed, \((B01L 3/50, for DNA, C12Q 1/6834, for biological materials, G01N 33/54)\)]

49/0413 . . . [for automated handling]

49/0418 . . . [for laser desorption, e.g. matrix-assisted laser desorption/ionisation [MALDI], surface enhanced laser desorption/ionisation [SELDI] plates]

49/0422 . . . [for gaseous samples (interfaces to gas chromatographs G01N 30/7206)]

49/0427 . . [using a membrane permeable to gases]

49/0431 . . [for liquid samples (interfaces to liquid chromatographs G01N 30/7233)]

49/0436 . . [using a membrane permeable to liquids]

49/044 . . [with means for preventing droplets from entering the analyzer; Desolvation of droplets]

49/0445 . . [with means for introducing as a spray, a jet or an aerosol (electrospray ion sources \((H01J 49/165)\)]

49/045 . . [with means for using a nebulising gas, i.e. pneumatically assisted]

49/0454 . . [with means for vaporising using mechanical energy, e.g. by ultrasonic vibrations]

49/0459 . . [for solid samples]

49/0463 . . [Desorption by laser or particle beam, followed by ionisation as a separate step (sample holder per se \((H01J 49/0418)\)]

49/0468 . . [with means for heating or cooling the sample]

49/0472 . . [with means for pyrolysis]

49/0477 . . [using a hot fluid]

49/0481 . . [with means for collisional cooling]

49/0486 . . [with means for monitoring the sample temperature]

49/049 . . [with means for applying heat to desorb the sample; Evaporation]

49/0495 . . [Vacuum locks; Valves (valves per se \((F16K)\)]

49/06 . [Electron- or ion-optical arrangements]

49/061 . . [Ion deflecting means, e.g. ion gates]

49/062 . . [Ion guides (linear ion traps performing mass selection \((H01J 49/4225, mass filters \((H01J 49/421)\)]

49/063 . . [Multipole ion guides, e.g. quadrupoles, hexapoles]
49/065 . . . . [having stacked electrodes, e.g. ring stack, plate stack]
49/066 . . . . . [Ion funnels]
49/067 . . . . [Ion lenses, apertures, skimmers]
49/068 . . . . [Mounting, supporting, spacing, or insulating electrodes]
49/08 . . Electron sources, e.g. for generating photo-electrons, secondary electrons or Auger electrons
49/10 . . Ion sources; Ion guns
49/102 . . . . [using reflex discharge, e.g. Penning ion sources]
49/105 . . . . [using high-frequency excitation, e.g. microwave excitation, Inductively Coupled Plasma [ICP]]
49/107 . . . . [Arrangements for using several ion sources]
49/12 . . . . using an arc discharge, e.g. of the duoplasmatron type
49/123 . . . . [Duoplasmatrons]
49/126 . . . . [Other arc discharge ion sources using an applied magnetic field]
49/14 . . . . using particle bombardment, e.g. ionisation chambers
49/142 . . . . . [using a solid target which is not previously vapourised]
49/145 . . . . . [using chemical ionisation]
49/147 . . . . . [with electrons, e.g. electron impact ionisation, electron attachment (H01J 49/145 takes precedence)]
49/16 . . . . using surface ionisation, e.g. field-, thermionic- or photo-emission
49/161 . . . . . [using photoionisation, e.g. by laser]
49/162 . . . . . (Direct photo-ionisation, e.g. single photon or multi-photon ionisation]
49/164 . . . . . [Laser desorption/ionisation, e.g. matrix-assisted laser desorption/ionisation [MALDI] (sample holders H01J 49/0418)]
49/165 . . . . . [Electrospray ionisation]
49/167 . . . . . (Capillaries and nozzles specially adapted therefor; (electrostatic spraying per se B05B 5/00)]
49/168 . . . . . (Field ionisation, e.g. corona discharge (atmospheric pressure corona discharge per se H01T 19/00)]
49/18 . . . . using spark ionisation
49/20 . . . . Magnetic deflection
49/22 . . . . Electrostatic deflection
49/24 . . . . Vacuum systems, e.g. maintaining desired pressures
49/26 . . Mass spectrometers or separator tubes
49/28 . . . . Static spectrometers
49/282 . . . . . [using electrostatic analysers]
49/284 . . . . [using electrostatic and magnetic sectors with simple focusing, e.g. with parallel fields such as Aston spectrometer]
49/286 . . . . . [with energy analysis, e.g. Casting filter (in cathode-ray or electron-beam tubes H01J 29/84; electron-or ion-optical arrangements for separating electrons or ions from an analysing or processing beam H01J 37/05; micro- or spot-analysing tubes H01J 37/252)]
49/288 . . . . . [using crossed electric and magnetic fields perpendicular to the beam, e.g. Wien filter]
49/30 . . . . using magnetic analysers {, e.g. Dempster spectrometer}
49/305 . . . . . [with several sectors in tandem]
49/32 . . . . . [using double focusing]
49/322 . . . . . [with a magnetic sector of 90 degrees, e.g. Mattauch-Herzog type]
49/324 . . . . . [with an electrostatic section of 90 degrees, e.g. Nier-Johnson type]
49/326 . . . . . [with magnetic and electrostatic sectors of 90 degrees]
49/328 . . . . . [with a cycloid trajectory by using crossed electric and magnetic fields, e.g. trochoidal type]
49/34 . . . . Dynamic spectrometers
49/36 . . . . Radio frequency spectrometers, e.g. Bennett-type spectrometers, Redhead-type spectrometers
49/38 . . . . Omegatrons {Using ion cyclotron resonance}
49/40 . . . . Time-of-flight spectrometers (H01J 49/36 takes precedence)
49/401 . . . . . [characterised by orthogonal acceleration, e.g. focusing or selecting the ions, pusher electrode]
49/403 . . . . . [characterised by the acceleration optics and/or the extraction fields]
49/405 . . . . . [characterised by the reflectron, e.g. curved field, electrode shapes]
49/406 . . . . . (with multiple reflections (electrostatic traps H01J 49/4245)]
49/408 . . . . . [with multiple changes of direction, e.g. by using electric or magnetic sectors, closed-loop time-of-flight]
49/42 . . . . Stability-of-path spectrometers, e.g. monopole, quadrupole, multipole, farvitrions
49/4205 . . . . . [Device types]
49/421 . . . . . {Mass filters, i.e. deviating unwanted ions without trapping]
49/4215 . . . . . . (Quadrupole mass filters (H01J 49/4225 takes precedence)]
49/422 . . . . . . (Two-dimensional RF ion traps (ion guides without mass selection H01J 49/062)]
49/4225 . . . . . [Multipole linear ion traps, e.g. quadrupoles, hexapoles]
49/423 . . . . . [with radial ejection]
49/4235 . . . . . [Stacked rings or stacked plates]
49/424 . . . . . . (Three-dimensional ion traps, i.e. comprising end-cap and ring electrodes)
49/4245 . . . . . . (Electrostatic ion traps (H01J 49/422 takes precedence; multi-reflection time of flight spectrometers H01J 49/046)]
49/425 . . . . . [with a logarithmic radial electric potential, e.g. orbitraps]
49/4255 . . . . . [with particular constructional features]
49/426 . . . . . [Methods for controlling ions]
49/4265 . . . . . [Controlling the number of trapped ions, preventing space charge effects]
49/427 . . . . . [Ejection and selection methods]
49/4275 . . . . . [Applying a non-resonant auxiliary oscillating voltage, e.g. parametric excitation]
49/428 . . . . . . (Applying a notched broadband signal)
Discharge lamps

61/00 Gas-discharge or vapour-discharge lamps

61/02 Details
61/025 {Associated optical elements}
61/026 {Associated optical elements}
61/03 Electrodes (for igniting H01J 61/54); Screens; Shields
61/045 {Thermic screens or reflectors (heat-reflecting coatings on the wall of the vessel H01J 61/35)}
61/06 Main electrodes
61/067 . . . for low-pressure discharge lamps
61/0672 . . . [characterised by the construction of the electrode]
61/0675 . . . [characterised by the material of the electrode]
61/0677 . . . [characterised by the electron emissive material]
61/073 . . . for high-pressure discharge lamps
61/0732 . . . [characterised by the construction of the electrode]
61/0735 . . . [characterised by the material of the electrode]
61/0737 . . . [characterised by the electron emissive material]
61/09 . . . Hollow cathodes
61/10 . . . Shields, screens, or guides for influencing the discharge
61/103 . . . [Shields, screens or guides arranged to extend the discharge path (H01J 61/106 takes precedence)]
61/106 . . . {using magnetic means}
61/12 Selection of substances for gas fillings; Specified operating pressure or temperature
61/125 {having an halogenide as principal component}
61/14 having one or more carbon compounds as the principal constituents
61/16 having helium, argon, neon, krypton, or xenon as the principle constituent

61/18 . . . having a metallic vapour as the principal constituent
61/20 . . . mercury vapour
61/22 . . . vapour of an alkali metal
61/24 Means for obtaining or maintaining the desired pressure within the vessel
61/26 Means for absorbing or adsorbing gas, e.g. by gettering; Means for preventing blackening of the envelope
61/28 Means for producing, introducing, or replenishing gas or vapour during operation of the lamp
61/30 . . . Vessels; Containers
61/302 . . . [characterised by the material of the vessel]
61/305 . . . [Flat vessels or containers]
61/307 . . . [with folded elongated discharge path]
61/32 . . . Special longitudinal shape, e.g. for advertising purposes ((H01J 61/305 takes precedence))
61/322 . . . [Circular lamps]
61/325 . . . [U-shaped lamps]
61/327 . . . ["Compact"-lamps, i.e. lamps having a folded discharge path]
61/33 . . . Special shape of cross-section, e.g. for producing cool spot
61/34 . . . Double-wall vessels or containers
61/35 . . . provided with coatings on the walls thereof; Selection of materials for the coatings (using coloured coatings H01J 61/40; using luminescent coatings H01J 61/42)
61/36 . . . Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors
61/361 . . . {Seals between parts of vessel}
61/363 . . . {End-disc seals or plug seals}
61/365 . . . {Annular seals disposed between the ends of the vessel (H01J 61/363 takes precedence)}
61/366 . . . {Seals for leading-in conductors}
61/368 . . . {Pinched seals or analogous seals}
61/38 . . . Devices for influencing the colour or wavelength of the light
61/40 . . . by light filters; by coloured coatings in or on the envelope
61/42 . . . by transforming the wavelength of the light by luminescence
61/44 . . . Devices characterised by the luminescent material
61/46 . . . Devices characterised by the binder or other non-luminescent constituent of the luminescent material, e.g. for obtaining desired pouring or drying properties
61/48 . . . Separate coatings of different luminous materials
61/50 . . . Auxiliary parts or solid material within the envelope for reducing risk of explosion upon breakage of the envelope, e.g. for use in mines
61/52 . . . Cooling arrangements; Heating arrangements; Means for circulating gas or vapour within the discharge space {heating or cooling arrangements to promote ionisation for starting H01J 61/54}
61/523 . . . [Heating or cooling particular parts of the lamp]
61/526 . . . [heating or cooling of electrodes]
61/54 . . . Igniting arrangements, e.g. promoting ionisation for starting
63/00 Cathode-ray or electron-stream lamps

63/02 Details, e.g. electrode, gas filling, shape of vessel
63/04 . . . Vessels provided with luminescent coatings; Selection of materials for the coatings
63/06 . . . Lamps with luminescent screen excited by the ray or stream

65/00 Lamps without any electrode inside the vessel; Lamps with at least one main electrode outside the vessel

65/04 . . . Lamps in which a gas filling is excited to luminesce by an external electromagnetic field or by external corpuscular radiation, e.g. for indicating [plasma display panels]

65/06 . . . Lamps in which a screen or coating is excited to luminesce by radioactive material structurally associated with the lamp, e.g. inside the vessel

99/00 Subject matter not provided for in other groups of this subclass
2201/30 . . . . Cold cathodes
2201/304 . . . . Field emission cathodes
2201/30403 . . . . characterised by the emitter shape
2201/30407 . . . . Microengineered point emitters
2201/30411 . . . . conical shaped, e.g. Spindt type
2201/30415 . . . . needle shaped
2201/30419 . . . . Pillar shaped emitters
2201/30423 . . . . Microengineered edge emitters
2201/30426 . . . . Coatings on the emitter surface, e.g. with low work function materials
2201/3043 . . . . Fibres
2201/30434 . . . . Nanotubes
2201/30438 . . . . Particles
2201/30442 . . . . Whiskers
2201/30446 . . . . characterised by the emitter material
2201/30449 . . . . Metals and metal alloys
2201/30453 . . . . Carbon types
2201/30457 . . . . Diamond
2201/30461 . . . . Graphite
2201/30465 . . . . Fullerenes
2201/30469 . . . . Carbon nanotubes (CNTs)
2201/30473 . . . . Amorphous carbon
2201/30476 . . . . Diamond-like carbon [DLC]
2201/3048 . . . . Semiconductor materials
2201/30484 . . . . Carbides
2201/30488 . . . . Nitrides
2201/30492 . . . . Borides
2201/30496 . . . . Oxides
2201/306 . . . . Ferroelectric cathodes
2201/308 . . . . Semiconductor cathodes, e.g. having PN junction layers
2201/312 . . . . having an electric field perpendicular to the surface thereof
2201/3125 . . . . Metal-insulator-Metal [MIM] emission type cathodes
2201/316 . . . . having an electric field parallel to the surface thereof, e.g. thin film cathodes
2201/3165 . . . . Surface conduction emission type cathodes
2201/317 . . . . combined with other synergetic effects, e.g. secondary, photo- or thermal emission
2201/319 . . . . Circuit elements associated with the emitters by direct integration
2201/3195 . . . . Resistive members, e.g. resistive layers
2201/32 . . . . Secondary emission electrodes
2201/34 . . . . Photoemissive electrodes
2201/342 . . . . Cathodes
2201/3421 . . . . Composition of the emitting surface
2201/3423 . . . . Semiconductors, e.g. GaAs, NEA emitters
2201/3425 . . . . Metals, metal alloys
2201/3426 . . . . Alkaline metal compounds, e.g. Na-K-Sb
2201/3428 . . . . Organo-metallic compounds, e.g. Ferrocene

2203/00 Electron or ion optical arrangements common to discharge tubes or lamps
2203/02 . . . . Electron guns
2203/0204 . . . . using cold cathodes, e.g. field emission cathodes
2203/0208 . . . . Control electrodes
2203/0212 . . . . Gate electrodes
2203/0216 . . . . characterised by the form or structure
2203/022 . . . . Shapes or dimensions of gate openings
2203/0224 . . . . Arrangement of gate openings
2203/0228 . . . . Curved/extending upwardly
2203/0232 . . . . characterised by the material
2203/0236 . . . . Relative position to the emitters, cathodes or substrates
2203/024 . . . . Focusing electrodes
2203/0244 . . . . characterised by the form or structure
2203/0248 . . . . Shapes or dimensions of focusing electrode openings
2203/0252 . . . . Arrangement of focusing electrode openings
2203/0256 . . . . characterised by the material
2203/026 . . . . Relative position to the gate electrodes, cathodes or substrates
2203/0264 . . . . In the same plane as the gate electrodes or cathodes
2203/0268 . . . . Insulation layer
2203/0272 . . . . for gate electrodes
2203/0276 . . . . for focusing electrodes
2203/028 . . . . characterised by the shape
2203/0284 . . . . Dimensions of openings
2203/0288 . . . . characterised by the material
2203/0292 . . . . Potentials applied to the electrodes
2203/0296 . . . . Spin-polarised beams
2203/04 . . . . Ion guns
2209/00 Apparatus and processes for manufacture of discharge tubes
2209/01 . . . . Generalised techniques
2209/012 . . . . Coating
2209/015 . . . . Machines therefor
2209/017 . . . . Cleaning
2209/02 . . . . Manufacture of cathodes
2209/022 . . . . Cold cathodes
2209/0223 . . . . Field emission cathodes
2209/0226 . . . . Sharpening or resharpening of emitting point or edge
2209/018 . . . . Assembling together the component parts of the discharge tube
2209/015 . . . . Machines therefor, e.g. electron gun assembling devices
2209/0236 . . . . Manufacture of magnetic deflecting devices
2209/02363 . . . . Coils
2209/02366 . . . . Machines therefor, e.g. winding, forming, welding, or the like
2209/026 . . . . Sealing parts of the vessel to provide a vacuum enclosure
2209/0261 . . . . Apparatus used for sealing vessels, e.g. furnaces, machines or the like
2209/0262 . . . . means for applying sealing materials, e.g. frit paste dispensers
2209/0264 . . . . Materials for sealing vessels, e.g. frit glass compounds, resins or structures
2209/0265 . . . . Surfaces for sealing vessels
2209/0267 . . . . shaped surfaces or flanges
2209/0268 . . . . treated surfaces and surface preparations, e.g. to improve adhesion
2209/038 . . . . Control of maintenance of pressure in the vessel
2209/0383 . . . . Vacuum pumps
2209/0385 . . . . Gettering
2209/0585 . . . . Getter materials
2209/0387 . . . . Gas filling
2209/0389 . . . . Degassing
2209/0393 . . . . by a discharge
2209/0396 . . . . by heating
2211/00 Plasma display panels with alternate current induction of the discharge, e.g. AC-PDPs (plasma display panels making use of direct current H01J 2217/00)

2211/10 AC-PDPs with at least one main electrode being out of contact with the plasma

2211/12 with main electrodes provided on both sides of the discharge space

2211/14 with main electrodes provided only on one side of the discharge space

2211/16 with main electrodes provided inside or on the side face of the spacers

2211/18 containing a plurality of independent closed structures for containing the gas, e.g. plasma tube array [PTA] display panels

2211/20 Constructional details

2211/22 Electrodes

2211/225 Material of electrodes

2211/24 Sustain electrodes or scan electrodes

2211/245 Shape, e.g. cross section or pattern

2211/26 Address electrodes

2211/265 Shape, e.g. cross section or pattern

2211/28 Auxiliary electrodes, e.g. priming electrodes or trigger electrodes

2211/30 Floating electrodes

2211/32 Disposition of the electrodes

2211/323 Mutual disposition of electrodes

2211/326 Disposition of electrodes with respect to cell parameters (H01J 2211/323 takes precedence) e.g. electrodes within the ribs

2211/34 Vessels, containers or parts thereof, e.g. substrates

2211/36 Spacers, barriers, ribs, partitions or the like

2211/361 characterized by the shape

2211/363 Cross section of the spacers

2211/365 Pattern of the spacers

2211/366 characterized by the material

2211/368 Dummy spacers, e.g. in a non display region

2211/38 Dielectric or insulating layers

2211/40 Layers for protecting or enhancing the electron emission, e.g. MgO layers

2211/42 Fluorescent layers

2211/44 Optical arrangements or shielding arrangements, e.g. filters or lenses

2211/442 Light reflecting means; Anti-reflection means

2211/444 Means for improving contrast or colour purity, e.g. black matrix or light shielding means

2211/446 Electromagnetic shielding means; Antistatic means

2211/448 Near infrared shielding means

2211/46 Connecting or feeding means, e.g. leading-in conductors

2211/48 Sealing, e.g. seals specially adapted for leading-in conductors

2211/50 Filling, e.g. selection of gas mixture

2211/52 Means for absorbing or adsorbing the gas mixture, e.g. by gettering

2211/54 Means for exhausting the gas

2211/62 Circuit arrangements (circuits or methods for driving PDP's G01G 3/28)

2211/66 Cooling arrangements (cooling or supporting means not being part of the tube H05K)

2217/00 Gas-filled discharge tubes (H01J 2211/00 takes precedence)

2217/04 Electrodes (for display panels not making use of alternating current H01J 2217/492; for discharge tubes in general H01J 2201/00)

2217/06 Cathodes

2217/062 thermionic

2217/065 heated by the discharge

2217/067 Cold cathodes

2217/10 Anodes

2217/12 Control electrodes

2217/38 Cold-cathode tubes

2217/40 Gas discharge switches

2217/402 Multiple switches

2217/4025 for addressing electro-optical devices, i.e. LCD's

2217/49 Display panels, e.g. not making use of alternating current (H01J 2211/10 takes precedence)

2217/491 characterised by problems peculiar to plasma displays

2217/4915 Luminosity

2217/492 Details

2217/49207 Electrodes

2217/49214 Shape

2217/49221 Mutual disposition

2217/49228 Crossed electrodes

2217/49235 Side-by-side electrodes

2217/49242 Auxiliary electrodes

2217/4925 Mounting, supporting, spacing

2217/49257 Means for isolating electrodes from the discharge, e.g. dielectric layers

2217/49264 Vessels

2217/49271 Spacers between front and back panels

2217/49278 Coatings (H01J 2217/49292 takes precedence)

2217/49285 Associated optical means (combined with electromagnetic screens H01J 2217/49292)

2217/49292 Filters

2217/494 A.C. panels

2217/498 Hybrid panels (AC and DC)

2223/00 Details of transit-time tubes of the types covered by group H01J 2225/00

2223/005 Cooling methods or arrangements

2223/02 Electrodcs; Magnetic control means; Screens

2223/027 Collectors

2223/0275 Multistage collectors

2223/033 Collector cooling devices

2223/04 Cathodes

2223/05 having a cylindrical emissive surface, e.g. cathodes for magnetrons

2223/06 Electron or ion guns

2223/065 producing a solid cylindrical beam

2223/07 producing a hollow cylindrical beam

2223/075 Magnetron injection guns

2223/08 Focusing arrangements, e.g. for concentrating stream of electrons, for preventing spreading of stream
Transit-time tubes, e.g. Klystrons, travelling-wave tubes, magnetrons
Details of cathode ray tubes or electron beam tubes

2229/0007. . . Elimination of unwanted or stray electromagnetic effects
2229/0015. . . Preventing or cancelling fields leaving the enclosure
2229/0023. . . Passive means
2229/0003. . . Preventing or cancelling fields entering the enclosure
2229/0038. . . Active means
2229/0046. . . Preventing or cancelling fields within the enclosure
2229/0053. . . Demagnetisation
2229/0061. . . Cooling arrangements
2229/0069. . . Active means, e.g. fluid flow
2229/0076. . . applied to the faceplate

2229/0084. . . Translucent coolant, e.g. flowing across faceplate
2229/0092. . . Passive means, e.g. fins, heat conductors
2229/007. . . Shadow masks
2229/0705. . . Mounting arrangement of assembly to vessel
2229/0711. . . Spring and plate (clip) type
2229/0716. . . Mounting arrangements of aperture plate to frame or vessel
2229/0722. . . Frame
2229/0727. . . Aperture plate
2229/0733. . . characterised by the material
2229/0738. . . Mitigating undesirable mechanical effects
2229/0744. . . Vibrations
2229/075. . . Beam passing apertures, e.g. geometrical arrangements
2229/0755. . . characterised by aperture shape
2229/0761. . . Uniaxial masks having parallel slit apertures, i.e. Trinitron type
2229/0766. . . Details of skirt or border
2229/0772. . . Apertures, cut-outs, depressions, or the like
2229/0777. . . Coatings
2229/0783. . . improving thermal radiation properties
2229/0788. . . Parameterised dimensions of aperture plate, e.g. relationships, polynomial expressions
2229/0794. . . Geometrical arrangements, e.g. curvature
2229/0796. . . Phosphor screens
2229/0799. . . multi-layer
2229/0806. . . Geometrical arrangement of phosphors
2229/0814. . . Electron guns
2229/0820. . . Electrodes
2229/0826. . . Shield centering cups
2229/0831. . . Focusing electrodes
2229/0836. . . Pre-focused
2229/0841. . . Accelerating electrodes
2229/0842. . . Extraction grids
2229/0847. . . Constructional arrangements of electrodes
2229/0852. . . Electrodes formed on surface of common cylindrical support
2229/0857. . . Electrode supports
2229/0860. . . Electrical arrangements coupled to electrodes, e.g. potentials
2229/0867. . . characterised by the potentials applied
2229/0879. . . Dynamic potentials
2229/0884. . . characterised by beam passing apertures or combinations
2229/0885. . . Aperture shape as viewed along beam axis
2229/0891. . . trapezoidal
2229/0896. . . with rounded end or ends
2229/0899. . . parallelogram
2229/0904. . . square
2229/0909. . . rectangle
2229/0914. . . with rounded end or ends
2229/0920. . . circular
2229/0925. . . oval
2229/0930. . . non-symmetric about field scanning axis
2229/0935. . . non-symmetric about line scanning axis
2229/0940. . . polygonal
2229/0945. . . cross shaped
2229/0949. . . Interconnected apertures
2229/0950. . . complex and not provided for
2229/0959. . . Plurality of guns or beams
2229/0969. . . Three beam guns, e.g. for colour CRTs
Coatings

Electron beam control inside the vessel

Electron beam control outside the vessel

Means for indicating the position of the beam, associated with the gun structure

Associated with the deflection system

Means providing or assisting electrical connection with or within the tube

Permanent magnet shielding

Digital scanning

Passive shielding means associated with the vessel

Resistive and conductive shielding

Electromagnetic shielding

Magnetic shielding

Optical components associated with the vessel

Fixing of optical components to the vessel

Wires and conductors

Form of conductor

Coil separators and formers

Faceplates

Characterised by shape

Parameterised shape, e.g. expression, relationship or equation

Substrates

Frames

Coatings

Characterised by the material

Meshes and patterns

Magnetic shielding

Antistatic shielding

Electromagnetic shielding

Mechanical shielding, e.g. against water or abrasion

Ions and radiation shielding, e.g. X-rays

Means for avoiding vessel implosion

Means substantially covering the output face, e.g. resin layers, protective panels

Coatings

Having particular electrical resistive or conductive properties

Having particular electrical insulation properties

Having particular X-ray shielding properties

Optical components associated with the vessel

Fixing of optical components to the vessel

Fibre optic components

Direction sensitive devices for controlled viewing angle

Image projection devices

Baffles, shutters, apertures or the like against external light

Large-scale devices, e.g. foldable screens

Anti-reflection, anti-glare, viewing angle and contrast improving treatments or devices

Surface treatment of vessel or device, e.g. controlled surface roughness

Inside the vessel

By using interference effects

Effect varying over surface

Apparatus attached to vessel and not integral therewith

Having particular properties for protecting the vessel, e.g. against abrasion, water or shock

Active components, e.g. LCD’s, indicators, illuminators and moving devices

Laser CRTs

Using lenses

Photographic devices (permanent recording of images)

Means for obtaining or maintaining the desired pressure within the tube

Circuit elements other than coils, reactors or the like, associated with the tube

Associated with the HT

Associated with the deflection system

Associated with the gun structure

Resistors

Cathode ray tubes or electron beam tubes

Cathode ray tubes or electron beam tubes

(2231/00 takes precedence)

CRTs having luminescent screens

Means for indicating the position of the beam, e.g. beam indexing

By direct current detection, e.g. collecting electrodes

With a plurality of electron guns within the tube envelope

Two or more neck portions containing one or more guns

Imaging and conversion tubes

Characterised by form of illumination

Photons

Light

Ultra-violet

Infrared

High energy photons

X-rays

Particles

Charged particles

Mechanical vibrations, e.g. sound

Characterised by form of output stage
**2235/00** X-ray tubes

- **2235/02** Electrical arrangements
- **2235/023** Connecting of signals or tensions to or through the vessel
- **2235/0233** High tension
- **2235/0236** Indirect coupling, e.g. capacitive or inductive
- **2235/06** Cathode assembly
- **2235/062** Cold cathodes
- **2235/064** Movement of cathode
- **2235/066** Rotation
- **2235/068** Multi-cathode assembly
- **2235/08** Targets (anodes) and X-ray converters
- **2235/081** Target material
- **2235/082** Fluids, e.g. liquids, gases
- **2235/083** Bonding or fixing with the support or substrate
- **2235/084** Target-substrate interlayers or structures, e.g. to control or prevent diffusion or improve adhesion
- **2235/085** Target treatment, e.g. ageing, heating
- **2235/086** Target geometry
- **2235/088** Laminated targets, e.g. plurality of emitting layers or unique differing materials
- **2235/10** Drive means for anode (target) substrate
- **2235/1006** Supports or shafts for target or substrate
- **2235/1013** Fixing to the target or substrate
- **2235/102** Materials for the shaft
- **2235/1026** Means (motors) for driving the target (anode)
- **2235/1033** mounted within the vacuum vessel
- **2235/104** characterised by the shape
- **2235/1046** Bearings and bearing contact surfaces
- **2235/1053** Retainers or races
- **2235/106** Dynamic pressure bearings, e.g. helical groove type
- **2235/1066** Treated contact surfaces, e.g. coatings
- **2235/1073** Magnetic bearings
- **2235/108** Lubricants
- **2235/1086** Liquid metals
- **2235/1093** Measures for preventing vibration
- **2235/12** Cooling
- **2235/1204** of the anode
- **2235/1208** of the bearing assembly
- **2235/1212** of the cathode
- **2235/1216** of the vessel
- **2235/122** of the window
- **2235/1225** characterised by method
- **2235/123** employing layers with high emissivity
- **2235/1233** characterised by the material
- **2235/1237** Oxides
- **2235/1241** Bonding layer to substrate
- **2235/1245** Increasing emissive surface area
- **2235/125** with interdigitated fins or slots
- **2235/1254** with microscopic surface features
- **2235/1258** Placing objects in close proximity
- **2235/1262** Circulating fluids
- **2235/1266** flow being via moving conduit or shaft
- **2235/127** Control of flow
- **2235/1275** characterised by the fluid
- **2235/1279** Liquid metals
- **2235/1283** in conjunction with extended surfaces (e.g. fins or ridges)
- **2235/1287** Heat pipes
- **2235/1291** Thermal conductivity
- **2235/1295** Contact between conducting bodies
- **2235/16** Vessels
- **2235/161** Non-stationary vessels
- **2235/162** Rotation
- **2235/163** shaped for a particular application
- **2235/164** Small cross-section, e.g. for entering in a body cavity
- **2235/165** Shielding arrangements
- **2235/166** against electromagnetic radiation
- **2235/167** against thermal (heat) energy
- **2235/168** against charged particles
- **2235/18** Windows, e.g. for X-ray transmission
- **2235/183** Multi-layer structures
- **2235/20** Arrangements for controlling gases within the X-ray tube
- **2235/205** Gettering

**2237/00** Discharge tubes exposing object to beam, e.g. for analysis treatment, etching, imaging

**NOTES**

1. For features of general interest which may be found in other types of discharge tubes, an indexing code corresponding to general schemes **H01J 2237/00** - **H01J 2237/2487** is given, e.g. for cathodes, vessels, cooling means or the like.
2. Same rules apply for manufacturing procedures (**H01J 2209/00**), unless really specific to the tube concerned.
3. The codes in this main group are grouped according to the following principle:
   - details common to gas or plasma discharge of the above mentioned tubes: **H01J 2237/00** - **H01J 2237/2487**
   - Imaging or analysing: **H01J 2237/25** - **H01J 2237/2857**
   - particle beam processing: **H01J 2237/30** - **H01J 2237/31798**
   - plasma processing: **H01J 2237/32** - **H01J 2237/339**

- **2237/002** Cooling arrangements (of objects being observed or treated **H01J 2237/2001**)
- **2237/004** Charge control of objects or beams
- **2237/0041** Neutralising arrangements
- **2237/0042** Reflection of neutralising particles
- **2237/0044** of objects being observed or treated
H01J

2237/0045 . . . . using secondary electrons
2237/0047 . . . . using electromagnetic radiations, e.g. UV, X-rays, light
2237/0048 . . . . Charging arrangements
2237/006 . . . . Details of gas supplies, e.g. in an ion source, to a beam line, to a specimen or to a workpiece, (H01J 37/3244 takes precedence; environmental cells for electron microscopes H01J 2237/2003; microscopes with environmental specimen chamber H01J 2237/2608)
2237/02 . . . . Details
2237/0203 . . . . Protection arrangements
2237/0206 . . . . Extinguishing, preventing or controlling unwanted discharges
2237/0209 . . . . Avoiding or diminishing effects of eddy currents
2237/0213 . . . . Avoiding deleterious effects due to interactions between particles and tube elements
2237/0216 . . . . Means for avoiding or correcting vibration effects
2237/022 . . . . Avoiding or removing foreign or contaminating particles, debris or deposits on sample or tube
2237/0225 . . . . Detecting or monitoring foreign particles
2237/024 . . . . Moving components not otherwise provided for (diaphragms H01J 2237/0458; objects H01J 2237/202)
2237/0245 . . . . Moving whole optical system relatively to object
2237/026 . . . . Shields
2237/0262 . . . . electrostatic
2237/0264 . . . . magnetic
2237/0266 . . . . electromagnetic
2237/0268 . . . . Liner tubes
2237/028 . . . . Particle traps
2237/03 . . . . Mounting, supporting, spacing or insulating electrodes
2237/032 . . . . Mounting or supporting
2237/036 . . . . Spacing
2237/038 . . . . Insulating
2237/04 . . . . Means for controlling the discharge
2237/041 . . . . Beam polarising means
2237/043 . . . . Beam blanking
2237/0432 . . . . High speed and short duration
2237/0435 . . . . Multi-aperture
2237/0437 . . . . Semiconductor substrate
2237/0437 . . . . Diaphragms
2237/045 . . . . with fixed aperture
2237/0453 . . . . multiple apertures
2237/0455 . . . . with variable aperture
2237/0456 . . . . Supports
2237/0458 . . . . movable, i.e. for changing between differently sized apertures
2237/047 . . . . Changing particle velocity
2237/0473 . . . . accelerating
2237/04732 . . . . with magnetic means
2237/04735 . . . . with electrostatic means
2237/04737 . . . . radio-frequency quadrupole [RFQ]
2237/0475 . . . . decelerating
2237/04753 . . . . with magnetic means
2237/04756 . . . . with electrostatic means
2237/049 . . . . Focusing means
2237/0492 . . . . Lens systems (individual lenses H01J 2237/10)
2237/04922 . . . . electromagnetic
2237/04924 . . . . electrostatic
2237/04926 . . . . combined
2237/04928 . . . . Telecentric systems
2237/05 . . . . Arrangements for energy or mass analysis
2237/053 . . . . electrostatic
2237/0535 . . . . Mirror analyser
2237/055 . . . . magnetic
2237/057 . . . . Energy or mass filtering
2237/06 . . . . Sources
2237/061 . . . . Construction
2237/062 . . . . Reducing size of gun
2237/063 . . . . Electron sources
2237/06308 . . . . Thermionic sources
2237/06316 . . . . Schottky emission
2237/06325 . . . . Cold-cathode sources
2237/06333 . . . . Photo emission
2237/06341 . . . . Field emission
2237/0635 . . . . Multiple source, e.g. comb or array
2237/06358 . . . . Secondary emission
2237/06366 . . . . Gas discharge electron sources
2237/06375 . . . . Arrangement of electrodes
2237/06383 . . . . Spin polarised electron sources
2237/06391 . . . . Positron sources
2237/065 . . . . Source emittance characteristics
2237/0653 . . . . Intensity
2237/0656 . . . . Density
2237/08 . . . . Ion sources
2237/0802 . . . . Field ionization sources
2237/0805 . . . . Liquid metal sources
2237/0807 . . . . Gas field ion sources [GFIS]
2237/081 . . . . Sputtering sources
2237/0812 . . . . Ionized cluster beam [ICB] sources
2237/0815 . . . . Methods of ionisation
2237/0817 . . . . Microwaves
2237/082 . . . . Electron beam
2237/0822 . . . . Multiple sources
2237/0825 . . . . for producing different ions simultaneously
2237/0827 . . . . for producing different ions sequentially
2237/083 . . . . Beam forming
2237/0835 . . . . Variable cross-section or shape
2237/10 . . . . Lenses
2237/103 . . . . characterised by lens type
2237/1035 . . . . Immersion lens
2237/12 . . . . electrostatic
2237/1202 . . . . Associated circuits
2237/1205 . . . . Microlenses
2237/1207 . . . . Einzel lenses
2237/121 . . . . characterised by shape
2237/1215 . . . . Annular electrodes
2237/1214 . . . . magnetic
2237/1405 . . . . Constructional details
2237/141 . . . . Coils (superconducting H01J 2237/142)
2237/1415 . . . . Bore or yokes, i.e. magnetic circuit in general
2237/142 . . . . with superconducting coils
2237/15 . . . . Means for deflecting or directing discharge
2237/1501 . . . . Beam alignment means or procedures
2237/1502 . . . . Mechanical adjustments
2237/1503 . . . . Mechanical scanning
2237/1504 . . . . Associated circuits
2237/1505 . . . . Rotating beam around optical axis
Tilting or rocking beam around an axis substantially at an angle to optical axis

dynamically, e.g. to obtain same impinging angle on whole area

Combined electrostatic-electromagnetic means

Electrostatic means

Travelling wave deflectors

Prisms

Multipoles

for X-Y scanning

Magnetic means

Prisms

For X-Y scanning

Correcting image defects, e.g. stigmators

Astigmatisms

Image distortions due to scanning

Space charge (Boersch) effect compensation (neutralising means H01J 2237/0041)

Vessels (liner tubes H01J 2237/0268)

Open vessel, i.e. one end sealed by object or workpiece

Particle-permeable windows

Sealing means

Vacuum control means

Obtaining or maintaining desired pressure

Evacuating means

Vacuum locks

Valves

Differential pressure

Positioning, supporting, modifying or maintaining the physical state of objects being observed or treated

Maintaining constant desired temperature

Controlling environment of sample

Environmental cells

Biological samples

Seal mechanisms

Vacuum seals

Holding mechanisms

specially adapted for studying electrical or magnetical properties of objects

for mounting multiple objects

Movement

Tilt

Rotation

Translation

Mechanical X-Y scanning

Z movement or adjustment

Eccentric movement

Sensing velocity of translation or rotation

Magnetic coupling

Piezoelectric devices

Temperature responsive devices

Motorised movement

computer-controlled

Means for position and/or orientation registration

Means for introducing and/or outputting objects (locks H01J 2237/184)

Modifying objects while observing

Mechanical constraints

Temperature variations (maintaining constant desired temperature H01J 2237/2001)

Surface alteration

Elements or methods for movement independent of sample stage for influencing or moving or contacting or transferring the sample or parts thereof, e.g. prober needles or transfer needles in FIB/SEM systems

Focus adjustment (lenses H01J 2237/10)

during electron or ion beam welding or cutting

Automatic focusing methods

Treatment of data (mixing signals H01J 2237/24495)

Image processing

Fourier techniques

Displaying image using synthesised colours

Image reconstruction

Charged particle holography

Detection characterized by the detecting means

Faraday cages

Semiconductor detectors, e.g. diodes

X-ray

Energy-dispersive (Si-Li type) spectrometer

Wavelength-dispersive spectrometer

Scintillation detectors

Microchannel plates

Electron Multiplier

using avalanche in a gas

Photon detectors for X-rays, light, e.g. photomultipliers

Transmitted particle detectors

Position sensitive detectors

Sected detectors, e.g. quadrants

Imaging plates

Scattered electron detectors

Secondary particle detectors

Energy spectrometers

Detector devices with moving charges in electric or magnetic fields

Signal processing, e.g. mixing of two or more signals

Detection characterised by the variable being measured

Intensity, dose or other characteristics of particle beams or electromagnetic radiation

Beam diagnostics including control of the parameter or property diagnosed (H01J 2237/30472 takes precedence)

Beam diameter

Direction of beam or parts thereof in view of the optical axis, e.g. beam angle, angular distribution, beam divergence, beam convergence or beam landing angle on sample or workpiece (means for deflecting or directing discharge H01J 2237/15)

Beam current

Beam profile

Polarisation (electromagnetic beams)

Spin polarisation (particles)

Measurements of electric or magnetic variables, e.g. voltage, current, frequency

Measurements of non-electric or non-magnetic variables
Electron or ion beam tubes for processing objects (ESCA, XPS) are used to characterise the application.

Transmission microscopes are typically used for operating at elevated pressures, e.g. atmosphere.

Scanning or non-scanning techniques are used for operating at elevated pressures, e.g. atmosphere.

Emission microscopes are used for operating at elevated pressures, e.g. atmosphere.

Ion beam bombardment sputtering is used for sputtering.

Beam diameter is used for controlling the beam.

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characterised by the type of processing

Arrangements for generating the plasma

Coating

CVD [Chemical Vapor Deposition]

uniformity

large area

high speed

Coating high aspect ratio workpieces

adhesion, stress, lift-off of deposited films

etching

reactive etching

resist stripping

Problems associated with etching

isotropy

anisotropy

selectivity

bottom of holes or trenches

direct-write microstructures

etching microareas

for repairing masks

introducing gas in vicinity of workpiece

for preparing specimen to be viewed in microscopes or analyzed in microanalyzers

using STM

focused ion beam

lithography

using particular beams or near-field effects, e.g. STM-like techniques

using electron beams

using ion beams

hybrid, i.e. charged particles and light, X-rays, plasma

using near-field effects, e.g. STM

patterning strategy

computer and memory organisation

Dividing into sub-patterns

Continuous moving of wafer

step and repeat

proximity effect correction

using multiple exposure

flood beam

Multi-beam

shaped beam

by projection

from patterned photocathode

from patterned cold cathode

M-I-M cathode

semiconductor cathode

Field-emitting cathode

through mask

reflection mask

scattering mask

problems associated with lithography

affecting masks

affecting resists

detecting pattern defects (with SEM H01J 2237/2817; correcting H01J 2237/31735, H01J 2237/3174)

processing objects by plasma generation

Arrangements for generating the plasma

caracterised by the type of processing

Coating

CVD [Chemical Vapor Deposition]

Problems associated with coating

uniformity

large area

High speed

Coating high aspect ratio workpieces

adhesion, stress, lift-off of deposited films

Etching

reactive etching

Resist stripping

Problems associated with etching

isotropy

anisotropy

Selectivity

bottom of holes or trenches

control of ion bombardment energy

Cleaning

holes or apertures, i.e. imprinted circuit boards

changing physical properties of treated surfaces

Plasma source implantation

changing chemical properties of treated surfaces

Polymerising

Carburising

Nitriding

Synthesising components

gas- or vapour-discharge lamps

Details

Electron emission display panels, e.g. field emission display panels

Cooling means

Multi-directional displaying, i.e. with multiple display faces facing in different directions

Vacuumless display panels, i.e. with phosphor directly applied to emitter without intermediate vacuum space

Electrodes other than control electrodes

Cathode electrodes

Thermionic cathodes

Cold cathodes other than those covered by H01J 2329/0407 - H01J 2329/0492

Field emission cathodes

characterised by the emitter shape

Microengineered point emitters

conical shaped, e.g. Spindt type

needle shaped

Pillar shaped emitters

Microengineered edge emitters

Coatings on the emitter surface, e.g. with low work function materials

fibres

nanotubes

particles

Whiskers

characterised by the emitter material

Metals or metal alloys

Carbon types

Diamond

Graphite

Fullerenes

Carbon nanotubes (CNTs)

Amorphous carbon

Diamond-like carbon [DLC]

Semiconductor materials

Carbides

Nitrides

Borides
Details

Electrodes and electrode systems suitable for discharge tubes or lamps

1. Oxides
2. Ferroelectric cathodes
3. Semiconductor cathodes, e.g. having PN junction layers
4. Cold cathodes having an electric field perpendicular to the surface thereof (H01J 2329/0407 - H01J 2329/0478 take precedence)
5. Metal-Insulator-Metal [MIM] emission type cathodes
6. Cold cathodes having an electric field parallel to the surface thereof, e.g. thin film cathodes
7. Surface conduction emission type cathodes
8. Cold cathodes combined with other synergetic effects, e.g. secondary, photo- or thermal emission
9. Circuit elements associated with the emitters by direct integration
10. Resistive members, e.g. resistive layers
11. Anode electrodes
12. Luminescent screens
13. characterised by the luminescent material
14. characterised by the binder or adhesive for securing the luminescent material to its support, e.g. substrate
15. with protective, conductive or reflective layers
16. Shape or geometrical arrangement of the luminescent material
17. Means associated with discontinuous arrangements of the luminescent material
18. Black matrix
19. Color filters structurally combined with the luminescent material
20. Arrangements of electrodes and associated parts for generating or controlling the electron beams
21. Control electrodes
22. Gate electrodes
23. characterised by the form or structure
24. Shapes or dimensions of gate openings
25. Arrangement of gate openings
26. Curved or extending upwardly
27. characterised by the material
28. characterised by the material of the getter
29. Arrangement of focusing electrode openings
30. characterised by the material
31. Relative position to the gate electrodes, emitters, cathodes or substrates
32. In the same plane as the gate electrodes or cathodes
33. Insulation layers
34. for gate electrodes
35. for focusing electrodes
36. characterised by the shape
37. Dimensions of openings
38. characterised by the material
39. Potentials applied to the electrodes
40. Vessels
41. Front or back plates
42. characterised by the shape
43. characterised by the material
44. Frames
45. Spacing members
46. characterised by the form or structure
47. having a corrugated lateral surface
48. characterised by the material
49. with coatings on the lateral surfaces thereof
50. Connection of the spacing members to the substrates or electrodes
51. Conductive or resistive layers
52. Adhesives
53. Spacer holding means
54. Seals between parts of vessels
55. Seals between the frame and the front and/or back plate
56. Passive shielding means of vessels
57. Antistatic shielding
58. Electromagnetic shielding
59. Mechanical shielding, e.g. against water or abrasion
60. Coatings on walls of the vessels (H01J 2329/18, H01J 2329/868, H01J 2329/869 take precedence)
61. Optical components structurally combined with the vessel
62. Anti-reflection, anti-glare, viewing angle and contrast improving means
63. Spectral filters
64. Lenses
65. Leading-in arrangements; seals therefor
66. Means forming part of the display panel for the purpose of providing electrical connection to it
67. Means for exhausting the vessel or maintaining vacuum within the vessel
68. Means for exhausting the vessel
69. Means for maintaining vacuum within the vessel
70. by gettering
71. characterised by the position or form of the getter
72. characterised by the material of the getter
73. Circuit elements structurally associated with the display panels (H01J 2329/0494 take precedence)

2893/00 Discharge tubes and lamps

1. Electrodes and electrode systems suitable for discharge tubes or lamps
2. Construction arrangements of electrode systems
3. Anodes forming part of vessel walls
4. Anodes formed in central part
5. Fixing of electrodes
6. Mounting
7. Machines for assembly
8. Supply leads; Electrode supports via rigid connection to vessel
9. Electrode system pressing against vessel wall
10. Non-constructive schematic arrangements
11. Non-emitting electrodes
12. Constructional arrangements
13. Sealed electrodes
14. Non-sealed electrodes
15. Planar grids
16. Cylindrical, helical or annular grids
Details

2893/0018 . . . Bar or cage-like grids
2893/0019 . . . Chemical composition and manufacture
2893/002 . . . . chemical
2893/0021 . . . carbon
2893/0022 . . . Manufacture
2893/0023 . . . carbonising and other surface treatments
2893/0024 . . . Planar grids
2893/0025 . . . by winding wire upon a support
2893/0026 . . . Machines for manufacture of grids or anodes
2893/0027 . . . Mitigation of temperature effects
2893/0029 . . . Electron beam tubes
2893/003 . . . Tubes with plural electrode systems
2893/0031 . . . Tubes with material luminescing under electron bombardment
2893/0032 . . . Tubes with variable amplification factor
2893/0033 . . . Vacuum connection techniques applicable to discharge tubes and lamps
2893/0034 . . . Lamp bases
2893/0035 . . . shaped as flat plates, in particular metallic
2893/0036 . . . having wires, ribbons or tubes placed between two vessel walls and being perpendicular to at least one of said walls
2893/0037 . . . Solid sealing members other than lamp bases
2893/0038 . . . Direct connection between two insulating elements, in particular via glass material
2893/0039 . . . Glass-to-glass connection, e.g. by soldering
2893/004 . . . Quartz-to-quartz connection
2893/0041 . . . Direct connection between insulating and metal elements, in particular via glass material
2893/0043 . . . Glass-to-metal or quartz-to-metal, e.g. by soldering
2893/0044 . . . Direct connection between two metal elements, in particular via material a connecting material
2893/0045 . . . Non-solid connections, e.g. liquid or rubber
2893/0046 . . . Lamp base with closure
2893/0047 . . . Closure other than lamp base
2893/0048 . . . Tubes with a main cathode
2893/0049 . . . Internal parts
2893/005 . . . Cathodes
2893/0051 . . . Anode assemblies; screens for influencing the discharge
2893/0052 . . . Anode supporting means
2893/0053 . . . Leading in for anodes; Protecting means for anode supports
2893/0054 . . . Cooling means
2893/0055 . . . Movable screens
2893/0056 . . . Parts inside tubes brought to incandescence by the discharge
2893/0058 . . . Grids; Auxiliary internal or external electrodes
2893/0059 . . . Arc discharge tubes
2893/006 . . . Tubes with electron bombarded gas (e.g. with plasma filter)
2893/0061 . . . Tubes with discharge used as electron source
2893/0062 . . . Tubes with temperature ionized gas as electron source
2893/0063 . . . Plasma light sources
2893/0064 . . . Tubes with cold main electrodes (including cold cathodes)
2893/0065 . . . Electrode systems
2893/0066 . . . Construction, material, support, protection and temperature regulation of electrodes; Electrode cups

2893/0067 . . . Electrode assembly without control electrodes, e.g. including a screen
2893/0068 . . . electrode assembly with control electrodes, e.g. including a screen
2893/0069 . . . Tubes for displaying characters
2893/007 . . . Sequential discharge tubes
2893/0072 . . . Disassembly or repair of discharge tubes
2893/0073 . . . Discharge tubes with liquid poolcathodes; constructional details
2893/0074 . . . Cathodic cups; Screens; Reflectors; Filters; Windows; Protection against mercury deposition; Returning condensed electrode material to the cathodic cup; Liquid electrode level control
2893/0075 . . . Cathodic cups
2893/0076 . . . Liquid electrode materials
2893/0077 . . . Cathodic cup construction; Cathodic spot control
2893/0078 . . . Mounting cathodic cups in the discharge tube
2893/0079 . . . Means for limiting the cathodic spot movement
2893/008 . . . Means for stabilising the cathodic spot
2893/0081 . . . Cooling means
2893/0082 . . . Returning condensed electrode material to the cathodic cup, e.g. including cleaning
2893/0083 . . . Liquid electrode level control
2893/0084 . . . Protection against mercury deposition
2893/0086 . . . Gas fill; Maintaining or maintaining desired pressure; Producing, introducing or replenishing gas or vapour during operation of the tube; Getters; Gas cleaning; Electrode cleaning
2893/0087 . . . Igniting means; Cathode spot maintaining or extinguishing means
2893/0088 . . . Tubes with at least a solid principal cathode and solid anodes
2893/0089 . . . Electrode systems
2893/009 . . . Anode systems; Screens
2893/0091 . . . Anode supporting means
2893/0092 . . . Anodic screens or grids
2893/0093 . . . Anodic arms
2893/0094 . . . Electrode arrangements; Auxiliary electrodes
2893/0095 . . . Tubes with exclusively liquid main electrodes
2893/0096 . . . Transport of discharge tube components during manufacture, e.g. wires, coils, lamps, contacts, etc.
2893/0097 . . . Incandescent wires of coils
2893/0098 . . . Vessels