

SECTION H — ELECTRICITY

H10 SEMICONDUCTOR DEVICES; ELECTRIC SOLID-STATE DEVICES NOT OTHERWISE PROVIDED FOR

H10K ORGANIC ELECTRIC SOLID-STATE DEVICES [2023.01]

Note(s) [2023.01]

1. This subclass covers:
 - individual organic electric solid-state devices, i.e. electric solid-state devices comprising organic material in the active part;
 - integrated devices, or assemblies of multiple devices, comprising such elements.
2. This subclass does not cover:
 - organic electronic memory devices, which are covered by subclass H10B;
 - organic thermoelectric devices, organic thermomagnetic devices, organic piezoelectric devices, organic electrostrictive devices, organic magnetostrictive devices, organic galvanomagnetic devices, organic Hall-effect devices, organic superconducting devices or organic solid-state devices having no potential barriers, and specially adapted for rectifying, amplifying, oscillating or switching, which are covered by subclass H10N;
 - organic resistors having no potential barriers and not specially adapted for integrated devices, which are covered by subclass H01C;
 - organic capacitors having no potential barriers and not specially adapted for integrated devices, which are covered by subclass H01G.
3. In this subclass, the periodic system used is the I to VIII group system indicated in the Periodic Table under Note (3) of section C.
4. In this subclass, it is desirable to add the indexing codes of groups H10K 101/00-H10K 102/00.

Subclass index

ORGANIC DEVICES SPECIALLY ADAPTED FOR RECTIFYING, AMPLIFYING, OSCILLATING OR SWITCHING

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Devices.....	30/00
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ORGANIC LIGHT-EMITTING DEVICES

Devices.....	50/00
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Integrated devices, or assemblies of multiple devices, comprising at least one organic radiation-sensitive element and at least one organic light-emitting element.....	65/00

MANUFACTURE OR TREATMENT; CONSTRUCTIONAL DETAILS

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INDEXING SCHEMES

Indexing schemes.....	101/00, 102/00
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Organic devices specially adapted for rectifying, amplifying, oscillating or switching [2023.01]

10/00 Organic devices specially adapted for rectifying, amplifying, oscillating or switching; Organic capacitors or resistors having potential barriers (integrated devices or assemblies of multiple devices H10K 19/00) [2023.01]

- 10/10 • Organic capacitors or resistors having potential barriers [2023.01]
- 10/20 • Organic diodes [2023.01]
- 10/23 • • Schottky diodes [2023.01]

- 10/26 • • Diodes comprising organic-organic junctions [2023.01]
- 10/29 • • Diodes comprising organic-inorganic heterojunctions [2023.01]
- 10/40 • Organic transistors [2023.01]
- 10/43 • • Bipolar transistors, e.g. organic bipolar junction transistors [OBJT] [2023.01]
- 10/46 • • Field-effect transistors, e.g. organic thin-film transistors [OTFT] (H10K 10/43 takes precedence) [2023.01]
- 10/50 • Bistable switching devices [2023.01]
- 10/80 • Constructional details [2023.01]

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- 10/82 • • Electrodes [2023.01]
- 10/84 • • • Ohmic electrodes, e.g. source or drain electrodes [2023.01]
- 10/86 • • • Schottky electrodes [2023.01]
- 10/88 • • Passivation; Containers; Encapsulations [2023.01]
- 19/00 Integrated devices, or assemblies of multiple devices, comprising at least one organic element specially adapted for rectifying, amplifying, oscillating or switching, covered by group H10K 10/00 [2023.01]**
- 19/10 • comprising field-effect transistors [2023.01]
- 19/20 • comprising components having an active region that includes an inorganic semiconductor [2023.01]
- 19/80 • Interconnections, e.g. terminals [2023.01]

Organic radiation-sensitive devices [2023.01]

- 30/00 Organic devices sensitive to infrared radiation, light, electromagnetic radiation of shorter wavelength or corpuscular radiation** (integrated devices or assemblies of multiple devices H10K 39/00, H10K 65/00; electrolytic light-sensitive devices H01G 9/20) [2023.01]

Note(s) [2023.01]

This group covers organic semiconductor devices sensitive to radiation insofar as these devices are specially adapted for either:

- the conversion of the radiation energy into electrical energy; or
- the control of electrical energy by such radiation.
- 30/10 • comprising heterojunctions between organic semiconductors and inorganic semiconductors [2023.01]
- 30/15 • • Sensitised wide-bandgap semiconductor devices, e.g. dye-sensitised TiO₂ (photo-electrochemical devices comprising a liquid electrolyte or a solid electrolyte H01G 9/20) [2023.01]
- 30/20 • comprising organic-organic junctions, e.g. donor-acceptor junctions [2023.01]
- 30/30 • comprising bulk heterojunctions, e.g. interpenetrating networks of donor and acceptor material domains [2023.01]
- 30/35 • • comprising inorganic nanostructures, e.g. CdSe nanoparticles [2023.01]
- 30/40 • comprising a p-i-n structure, e.g. having a perovskite absorber between p-type and n-type charge transport layers [2023.01]
- 30/50 • Photovoltaic [PV] devices [2023.01]
- 30/53 • • in the form of fibres or tubes, e.g. photovoltaic fibres [2023.01]
- 30/57 • • comprising multiple junctions, e.g. tandem PV cells [2023.01]
- 30/60 • in which radiation controls flow of current through the devices, e.g. photoresistors [2023.01]
- 30/65 • • Light-sensitive field-effect devices, e.g. phototransistors [2023.01]
- 30/80 • Constructional details [2023.01]
- 30/81 • • Electrodes [2023.01]
- 30/82 • • • Transparent electrodes, e.g. indium tin oxide [ITO] electrodes [2023.01]
- 30/83 • • • comprising arrangements for extracting the current from the cell, e.g. metal finger grid systems to reduce the serial resistance of transparent electrodes [2023.01]

- 30/84 • • Layers having high charge carrier mobility [2023.01]
- 30/85 • • • Layers having high electron mobility, e.g. electron-transporting layers or hole-blocking layers [2023.01]
- 30/86 • • • Layers having high hole mobility, e.g. hole-transporting layers or electron-blocking layers [2023.01]
- 30/87 • • Light-trapping means [2023.01]
- 30/88 • • Passivation; Containers; Encapsulations [2023.01]
- 30/89 • • Terminals, e.g. bond pads [2023.01]
- 39/00 Integrated devices, or assemblies of multiple devices, comprising at least one organic radiation-sensitive element covered by group H10K 30/00 [2023.01]**

Note(s) [2023.01]

This group only covers devices that are sensitive to infrared radiation, light, electromagnetic radiation of shorter wavelength or corpuscular radiation.

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- 39/10 • Organic photovoltaic [PV] modules; Arrays of single organic PV cells [2023.01]
 - 39/12 • • Electrical configurations of PV cells, e.g. series connections or parallel connections [2023.01]
 - 39/15 • • comprising both organic PV cells and inorganic PV cells [2023.01]
 - 39/18 • • Interconnections, e.g. terminals [2023.01]
 - 39/30 • Devices controlled by radiation [2023.01]
 - 39/32 • • Organic image sensors [2023.01]
 - 39/34 • • • integrated with organic light-emitting diodes [OLED] [2023.01]
 - 39/36 • • Devices specially adapted for detecting X-ray radiation [2023.01]
 - 39/38 • • Interconnections, e.g. terminals [2023.01]

Organic light-emitting devices [2023.01]

- 50/00 Organic light-emitting devices** (integrated devices or assemblies of multiple devices H10K 59/00, H10K 65/00; organic semiconductor lasers H01S 5/36) [2023.01]
- 50/10 • OLEDs or polymer light-emitting diodes [PLED] [2023.01]
- 50/11 • • characterised by the electroluminescent [EL] layers [2023.01]
- 50/115 • • • comprising active inorganic nanostructures, e.g. luminescent quantum dots [2023.01]
- 50/12 • • • comprising dopants [2023.01]
- 50/125 • • • specially adapted for multicolour light emission, e.g. for emitting white light [2023.01]
- 50/13 • • • comprising stacked EL layers within one EL unit [2023.01]
- 50/135 • • • comprising mobile ions [2023.01]
- 50/14 • • Carrier transporting layers [2023.01]
- 50/15 • • • Hole transporting layers [2023.01]
- 50/155 • • • comprising dopants [2023.01]
- 50/16 • • • Electron transporting layers [2023.01]
- 50/165 • • • comprising dopants [2023.01]
- 50/17 • • Carrier injection layers [2023.01]
- 50/18 • • Carrier blocking layers [2023.01]
- 50/19 • • Tandem OLEDs [2023.01]
- 50/30 • Organic light-emitting transistors [2023.01]
- 50/80 • Constructional details [2023.01]
- 50/805 • • Electrodes [2023.01]

- 50/81 • • • Anodes [2023.01]
- 50/813 • • • characterised by their shape [2023.01]
- 50/814 • • • combined with auxiliary electrodes, e.g. ITO layer combined with metal lines [2023.01]
- 50/816 • • • Multilayers, e.g. transparent multilayers [2023.01]
- 50/818 • • • Reflective anodes, e.g. ITO combined with thick metallic layers [2023.01]
- 50/82 • • • Cathodes [2023.01]
- 50/822 • • • characterised by their shape [2023.01]
- 50/824 • • • combined with auxiliary electrodes [2023.01]
- 50/826 • • • Multilayers, e.g. opaque multilayers [2023.01]
- 50/828 • • • Transparent cathodes, e.g. comprising thin metal layers [2023.01]
- 50/84 • • Passivation; Containers; Encapsulations [2023.01]
- 50/842 • • Containers [2023.01]
- 50/844 • • Encapsulations [2023.01]
- 50/85 • • Arrangements for extracting light from the devices [2023.01]
- 50/852 • • • comprising a resonant cavity structure, e.g. Bragg reflector pair [2023.01]
- 50/854 • • • comprising scattering means [2023.01]
- 50/856 • • • comprising reflective means [2023.01]
- 50/858 • • • comprising refractive means, e.g. lenses [2023.01]
- 50/86 • • Arrangements for improving contrast, e.g. preventing reflection of ambient light [2023.01]
- 50/87 • • Arrangements for heating or cooling [2023.01]
- 50/88 • • Terminals, e.g. bond pads [2023.01]
- 59/00 Integrated devices, or assemblies of multiple devices, comprising at least one organic light-emitting element covered by group H10K 50/00 [2023.01]**
- 59/10 • OLED displays [2023.01]
- 59/12 • • Active-matrix OLED [AMOLED] displays [2023.01]
- 59/121 • • • characterised by the geometry or disposition of pixel elements [2023.01]
- 59/122 • • Pixel-defining structures or layers, e.g. banks [2023.01]
- 59/123 • • Connection of the pixel electrodes to the thin film transistors [TFT] [2023.01]
- 59/124 • • Insulating layers formed between TFT elements and OLED elements [2023.01]
- 59/125 • • including organic TFTs [OTFT] [2023.01]
- 59/126 • • Shielding, e.g. light-blocking means over the TFTs [2023.01]
- 59/127 • • • comprising two substrates, e.g. display comprising OLED array and TFT driving circuitry on different substrates [2023.01]
- 59/128 • • • comprising two independent displays, e.g. for emitting information from two major sides of the display [2023.01]
- 59/129 • • • Chiplets [2023.01]
- 59/13 • • comprising photosensors that control luminance [2023.01]
- 59/131 • • Interconnections, e.g. wiring lines or terminals [2023.01]
- 59/17 • • Passive-matrix OLED displays [2023.01]
- 59/173 • • • comprising banks or shadow masks [2023.01]
- 59/176 • • • comprising two independent displays, e.g. for emitting information from two major sides of the display [2023.01]
- 59/179 • • • Interconnections, e.g. wiring lines or terminals [2023.01]
- 59/18 • • Tiled displays [2023.01]
- 59/19 • • Segment displays [2023.01]
- 59/30 • Devices specially adapted for multicolour light emission [2023.01]
- 59/32 • • Stacked devices having two or more layers, each emitting at different wavelengths [2023.01]
- 59/35 • • comprising red-green-blue [RGB] subpixels [2023.01]
- 59/38 • • comprising colour filters or colour changing media [CCM] [2023.01]
- 59/40 • OLEDs integrated with touch screens [2023.01]
- 59/50 • OLEDs integrated with light modulating elements, e.g. with electrochromic elements, photochromic elements or liquid crystal elements [2023.01]
- 59/60 • OLEDs integrated with inorganic light-sensitive elements, e.g. with inorganic solar cells or inorganic photodiodes [2023.01]
- 59/65 • • OLEDs integrated with inorganic image sensors [2023.01]
- 59/70 • OLEDs integrated with inorganic light-emitting elements, e.g. with inorganic electroluminescent elements [2023.01]
- 59/80 • Constructional details [2023.01]
- 59/82 • • Interconnections, e.g. terminals (H10K 59/131, H10K 59/179 take precedence) [2023.01]
- 59/84 • • Parallel electrical configurations of multiple OLEDs [2023.01]
- 59/86 • • Series electrical configurations of multiple OLEDs [2023.01]
- 59/88 • • Dummy elements, i.e. elements having non-functional features [2023.01]
- 59/90 • Assemblies of multiple devices comprising at least one organic light-emitting element [2023.01]
- 59/95 • • wherein all light-emitting elements are organic, e.g. assembled OLED displays [2023.01]
- 65/00 Integrated devices, or assemblies of multiple devices, comprising at least one organic light-emitting element and at least one organic radiation-sensitive element, e.g. organic opto-couplers** (organic image sensors integrated with organic light-emitting devices H10K 39/34; OLED displays integrated with photosensors H10K 59/13) [2023.01]
- Manufacture or treatment; Constructional details [2023.01]**
- 71/00 Manufacture or treatment specially adapted for the organic devices covered by this subclass [2023.01]**
- 71/10 • Deposition of organic active material [2023.01]
- 71/12 • • using liquid deposition, e.g. spin coating [2023.01]
- 71/13 • • • using printing techniques, e.g. ink-jet printing or screen printing [2023.01]
- 71/15 • • • characterised by the solvent used [2023.01]
- 71/16 • • using physical vapour deposition [PVD], e.g. vacuum deposition or sputtering [2023.01]
- 71/18 • • using non-liquid printing techniques, e.g. thermal transfer printing from a donor sheet [2023.01]
- 71/20 • Changing the shape of the active layer in the devices, e.g. patterning [2023.01]
- 71/30 • Doping active layers, e.g. electron transporting layers [2023.01]
- 71/40 • Thermal treatment, e.g. annealing in the presence of a solvent vapour [2023.01]

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- 71/50 • Forming devices by joining two substrates together, e.g. lamination techniques [2023.01]
- 71/60 • Forming conductive regions or layers, e.g. electrodes [2023.01]
- 71/70 • Testing, e.g. accelerated lifetime tests [2023.01]
- 71/80 • using temporary substrates [2023.01]

77/00 Constructional details of devices covered by this subclass and not covered by groups H10K 10/80, H10K 30/80, H10K 50/80 or H10K 59/80 [2023.01]

- 77/10 • Substrates, e.g. flexible substrates [2023.01]

85/00 Organic materials used in the body or electrodes of devices covered by this subclass [2023.01]

Note(s) [2023.01]

This group only covers organic materials for their electrical or other properties, insofar as they are specially adapted for the devices covered by this subclass.

- 85/10 • Organic polymers or oligomers [2023.01]
- 85/20 • Carbon compounds, e.g. carbon nanotubes or fullerenes [2023.01]
- 85/30 • Coordination compounds [2023.01]
- 85/40 • Organosilicon compounds, e.g. TIPS pentacene [2023.01]
- 85/50 • Organic perovskites; Hybrid organic-inorganic perovskites [HOIP], e.g. $\text{CH}_3\text{NH}_3\text{PbI}_3$ [2023.01]
- 85/60 • Organic compounds having low molecular weight (H10K 85/10-H10K 85/50 take precedence) [2023.01]

99/00 Subject matter not provided for in other groups of this subclass [2023.01]

Indexing scheme associated with group H10K 85/00, relating to properties of organic materials [2023.01]

101/00 Properties of the organic materials covered by group H10K 85/00 [2023.01]

- 101/10 • Triplet emission [2023.01]
- 101/20 • Delayed fluorescence emission [2023.01]
- 101/25 • • using exciplex [2023.01]
- 101/30 • Highest occupied molecular orbital [HOMO], lowest unoccupied molecular orbital [LUMO] or Fermi energy values [2023.01]
- 101/40 • Interrelation of parameters between multiple constituent active layers or sublayers, e.g. HOMO values in adjacent layers [2023.01]
- 101/50 • Oxidation-reduction potentials, e.g. excited state redox potentials [2023.01]
- 101/60 • Up-conversion, e.g. by triplet-triplet annihilation [2023.01]
- 101/70 • Down-conversion, e.g. by singlet fission [2023.01]

Indexing scheme associated with groups H10K 10/80, H10K 30/80, H10K 50/80, H10K 59/80 and H10K 77/00, relating to constructional details [2023.01]

102/00 Constructional details relating to the organic devices covered by this subclass [2023.01]

- 102/10 • Transparent electrodes, e.g. using graphene [2023.01]
- 102/20 • Metallic electrodes, e.g. using a stack of layers [2023.01]