SECTION H — ELECTRICITY

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

H10F INORGANIC SEMICONDUCTOR DEVICES SENSITIVE TO INFRARED RADIATION, LIGHT, ELECTROMAGNETIC RADIATION OF SHORTER WAVELENGTH OR CORPUSCULAR RADIATION [2025.01]

Note(s) [2025.01]

1. *This subclass covers inorganic radiation-sensitive semiconductor devices insofar as these devices are specially adapted for:*
   - *the conversion of the radiation energy into electrical energy; or*
   - *the control of electrical energy by such radiation.*
2. *In this subclass, "infrared radiation" includes wavelengths between about 700 nm and about 1 mm.*
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.*

Subclass index

Photovoltaics [2025.01]

10/00 ***Individual photovoltaic cells, e.g. solar cells*** *(electrolytic light-sensitive devices, e.g. dye-sensitised solar cells, H01G 9/20)* ***[2025.01]***

10/10 • *having potential barriers* ***[2025.01]***

10/11 • • *Photovoltaic cells having point contact potential barriers (H10F 10/18 takes precedence)* ***[2025.01]***

10/12 • • *Photovoltaic cells having only metal-insulator-semiconductor [MIS] potential barriers* ***[2025.01]***

10/13 • • *Photovoltaic cells having absorbing layers comprising graded bandgaps* ***[2025.01]***

10/14 • • *Photovoltaic cells having only PN homojunction potential barriers* ***[2025.01]***

10/142 • • • *comprising multiple PN homojunctions, e.g. tandem cells* ***[2025.01]***

10/144 • • • *comprising only Group III-V materials, e.g. GaAs,AlGaAs, or InP photovoltaic cells* ***[2025.01]***

10/16 • • *Photovoltaic cells having only PN heterojunction potential barriers* ***[2025.01]***

10/161 • • • *comprising multiple PN heterojunctions, e.g. tandem cells* ***[2025.01]***

10/162 • • • *comprising only Group II-VI materials, e.g. CdS/CdTe photovoltaic cells* ***[2025.01]***

10/163 • • • *comprising only Group III-V materials, e.g. GaAs/AlGaAs or InP/GaInAs photovoltaic cells* ***[2025.01]***

10/164 • • • *comprising heterojunctions with Group IV materials, e.g. ITO/Si or GaAs/SiGe photovoltaic cells* ***[2025.01]***

10/165 • • • • *the heterojunctions being Group IV-IV heterojunctions, e.g. Si/Ge, SiGe/Si or Si/SiC photovoltaic cells* ***[2025.01]***

10/166 • • • • • *the Group IV-IV heterojunctions being heterojunctions of crystalline and amorphous materials, e.g. silicon heterojunction [SHJ] photovoltaic cells* ***[2025.01]***

10/167 • • • *comprising Group I-III-VI materials, e.g. CdS/CuInSe$_2$ [CIS] heterojunction photovoltaic cells* ***[2025.01]***

10/17 • • *Photovoltaic cells having only PIN junction potential barriers* ***[2025.01]***

10/172 • • • *comprising multiple PIN junctions, e.g. tandem cells* ***[2025.01]***

10/174 • • • *comprising monocrystalline or polycrystalline materials* ***[2025.01]***

10/18 • • *Photovoltaic cells having only Schottky potential barriers* ***[2025.01]***

10/19 • • *Photovoltaic cells having multiple potential barriers of different types, e.g. tandem cells having both PN and PIN junctions* ***[2025.01]***

19/00 ***Integrated devices, or assemblies of multiple devices, comprising at least one photovoltaic cell covered by group H10F 10/00, e.g. photovoltaic modules [2025.01]***

19/10 • *comprising photovoltaic cells in arrays in a single semiconductor substrate, the photovoltaic cells having vertical junctions or V-groove junctions* ***[2025.01]***

19/20 • *comprising photovoltaic cells in arrays in or on a single semiconductor substrate, the photovoltaic cells having planar junctions (having multiple thin-film photovoltaic cells deposited on the same substrate H10F 19/31)* ***[2025.01]***

19/30 • *comprising thin-film photovoltaic cells* ***[2025.01]***

19/31 • • *having multiple laterally adjacent thin-film photovoltaic cells deposited on the same substrate* ***[2025.01]***

19/33 • • • *Patterning processes to connect the photovoltaic cells, e.g. laser cutting of conductive or active layers* ***[2025.01]***

19/35 • • • *Structures for the connecting of adjacent photovoltaic cells, e.g. interconnections or insulating spacers* ***[2025.01]***

19/37 • • • *comprising means for obtaining partial light transmission through the integrated devices, or the assemblies of multiple devices, e.g. partially transparent thin-film photovoltaic modules for windows* ***[2025.01]***

19/40 • *comprising photovoltaic cells in a mechanically stacked configuration* ***[2025.01]***

19/50 • *Integrated devices comprising at least one photovoltaic cell and other types of semiconductor or solid-state components (H10F 19/75 takes precedence)* ***[2025.01]***

19/70 • *comprising bypass diodes (bypass diodes in a junction box H02S 40/34)* ***[2025.01]***

19/75 • • *the bypass diodes being integrated or directly associated with the photovoltaic cells, e.g. formed in or on the same substrate* ***[2025.01]***

19/80 • *Encapsulations or containers for integrated devices, or assemblies of multiple devices, having photovoltaic cells* ***[2025.01]***

19/85 • • *Protective back sheets* ***[2025.01]***

19/90 • *Structures for connecting between photovoltaic cells, e.g. interconnections or insulating spacers (between thin-film photovoltaic cells on a single substrate H10F 19/35)* ***[2025.01]***

Radiation-controlled devices [2025.01]

30/00 ***Individual radiation-sensitive semiconductor devices in which radiation controls the flow of current through the devices, e.g. photodetectors [2025.01]***

30/10 • *the devices being sensitive to infrared radiation, visible or ultraviolet radiation, and having no potential barriers, e.g. photoresistors* ***[2025.01]***

30/20 • *the devices having potential barriers, e.g. phototransistors* ***[2025.01]***

30/21 • • *the devices being sensitive to infrared, visible or ultraviolet radiation* ***[2025.01]***

30/22 • • • *the devices having only one potential barrier, e.g. photodiodes* ***[2025.01]***

30/221 • • • • *the potential barrier being a PN homojunction* ***[2025.01]***

30/222 • • • • *the potential barrier being a PN heterojunction* ***[2025.01]***

30/223 • • • • *the potential barrier being a PIN barrier* ***[2025.01]***

30/225 • • • • *the potential barrier working in avalanche mode, e.g. avalanche photodiodes* ***[2025.01]***

30/227 • • • • *the potential barrier being a Schottky barrier* ***[2025.01]***

30/24 • • • *the devices having only two potential barriers, e.g. bipolar phototransistors* ***[2025.01]***

30/26 • • • *the devices having three or more potential barriers, e.g. photothyristors* ***[2025.01]***

30/28 • • • *the devices being characterised by field-effect operation, e.g. junction field-effect phototransistors* ***[2025.01]***

30/282 • • • • *Insulated-gate field-effect transistors [IGFET], e.g. MISFET [metal-insulator-semiconductor field-effect transistor] phototransistors* ***[2025.01]***

30/29 • • *the devices being sensitive to radiation having very short wavelengths, e.g. X-rays, gamma-rays or corpuscular radiation* ***[2025.01]***

30/292 • • • *Bulk-effect radiation detectors, e.g. Ge-Li compensated PIN gamma-ray detectors* ***[2025.01]***

30/295 • • • *Surface barrier or shallow PN junction radiation detectors, e.g. surface barrier alpha-particle detectors* ***[2025.01]***

30/298 • • • *the devices being characterised by field-effect operation, e.g. MIS type detectors* ***[2025.01]***

39/00 ***Integrated devices, or assemblies of multiple devices, comprising at least one element covered by group H10F 30/00, e.g. radiation detectors comprising photodiode arrays [2025.01]***

39/10 • *Integrated devices* ***[2025.01]***

39/12 • • *Image sensors* ***[2025.01]***

39/15 • • • *Charge-coupled device [CCD] image sensors* ***[2025.01]***

39/18 • • • *Complementary metal-oxide-semiconductor [CMOS] image sensors; Photodiode array image sensors* ***[2025.01]***

39/90 • *Assemblies of multiple devices* ***[2025.01]***

39/95 • • *comprising at least one integrated device covered by group H10F 39/10, e.g. comprising integrated image sensors* ***[2025.01]***

Other devices [2025.01]

55/00 ***Radiation-sensitive semiconductor devices covered by groups H10F 10/00, H10F 19/00 or H10F 30/00 being structurally associated with electric light sources and electrically or optically coupled thereto [2025.01]***

55/10 • *wherein the radiation-sensitive semiconductor devices control the electric light source, e.g. image converters, image amplifiers or image storage devices* ***[2025.01]***

55/15 • • *wherein the radiation-sensitive devices and the electric light source are all semiconductor devices* ***[2025.01]***

55/155 • • • *formed in, or on, a common substrate* ***[2025.01]***

55/20 • *wherein the electric light source controls the radiation-sensitive semiconductor devices, e.g. optocouplers* ***[2025.01]***

55/25 • • *wherein the radiation-sensitive devices and the electric light source are all semiconductor devices* ***[2025.01]***

55/255 • • • *formed in, or on, a common substrate* ***[2025.01]***

Manufacture or treatment; Constructional details [2025.01]

71/00 ***Manufacture or treatment of devices covered by this subclass*** *(patterning processes to connect thin photovoltaic cells in integrated devices, or assemblies of multiple devices, having photovoltaic cells H10F 19/33; manufacture or treatment of encapsulations or containers for integrated devices, or assemblies of multiple devices, having photovoltaic cells H10F 19/80; manufacture or treatment of integrated devices, or assemblies of multiple devices, comprising at least one element in which radiation controls the flow of current H10F 39/00)* ***[2025.01]***

71/10 • *the devices comprising amorphous semiconductor material* ***[2025.01]***

77/00 ***Constructional details of devices covered by this subclass*** *(constructional details of integrated devices, or assemblies of multiple devices, comprising at least one element in which radiation controls the flow of current H10F 39/00)* ***[2025.01]***

Note(s) [2025.01]

When classifying in this group, the type of device itself, when it is determined to be novel and non-obvious, should be classified in groups H10F 10/00, H10F 19/00, H10F 30/00 or H10F 55/00.

77/10 • *Semiconductor bodies* ***[2025.01]***

77/12 • • *Active materials* ***[2025.01]***

Note(s) [2025.01]

When classifying in this group, constituents of a material are considered irrespective of any dopants or other impurities.

77/121 • • • *comprising only selenium or only tellurium* ***[2025.01]***

77/122 • • • *comprising only Group IV materials* ***[2025.01]***

77/1223 • • • • *characterised by the dopants* ***[2025.01]***

77/1226 • • • • *comprising multiple Group IV elements, e.g. SiC* ***[2025.01]***

77/123 • • • *comprising only Group II-VI materials, e.g. CdS, ZnS or HgCdTe* ***[2025.01]***

77/124 • • • *comprising only Group III-V materials, e.g. GaAs* ***[2025.01]***

77/14 • • *Shape of semiconductor bodies; Shapes, relative sizes or dispositions of semiconductor regions within semiconductor bodies* ***[2025.01]***

77/16 • • *Material structures, e.g. crystalline structures, film structures or crystal plane orientations* ***[2025.01]***

77/162 • • • *Non-monocrystalline materials, e.g. semiconductor particles embedded in insulating materials (H10F 77/169 takes precedence)* ***[2025.01]***

77/164 • • • • *Polycrystalline semiconductors* ***[2025.01]***

77/166 • • • • *Amorphous semiconductors* ***[2025.01]***

77/169 • • • *Thin semiconductor films on metallic or insulating substrates* ***[2025.01]***

77/20 • *Electrodes* ***[2025.01]***

77/30 • *Coatings (arrangements for preventing damage to photovoltaic cells caused by corpuscular radiation H10F 77/80)* ***[2025.01]***

77/40 • *Optical elements or arrangements (surface textures H10F 77/70)* ***[2025.01]***

77/42 • • *directly associated or integrated with photovoltaic cells, e.g. light-reflecting means or light-concentrating means* ***[2025.01]***

77/45 • • • *Wavelength conversion means, e.g. by using luminescent material, fluorescent concentrators or up-conversion arrangements* ***[2025.01]***

77/48 • • • *Back surface reflectors [BSR]* ***[2025.01]***

77/50 • *Encapsulations or containers (for photovoltaic modules H10F 19/80)* ***[2025.01]***

77/60 • *Arrangements for cooling, heating, ventilating or compensating for temperature fluctuations* ***[2025.01]***

77/63 • • *Arrangements for cooling directly associated or integrated with photovoltaic cells, e.g. heat sinks directly associated with the photovoltaic cells or integrated Peltier elements for active cooling* ***[2025.01]***

77/67 • • • *including means to utilise heat energy directly associated with the photovoltaic cells, e.g. integrated Seebeck elements* ***[2025.01]***

77/70 • *Surface textures, e.g. pyramid structures* ***[2025.01]***

77/80 • *Arrangements for preventing damage to photovoltaic cells caused by corpuscular radiation, e.g. for space applications* ***[2025.01]***

77/90 • *Energy storage means directly associated or integrated with photovoltaic cells, e.g. capacitors integrated with photovoltaic cells* ***[2025.01]***

99/00 ***Subject matter not provided for in other groups of this subclass [2025.01]***