

Search history

Search step	Result(s)	Query
2	1	1 AND PD<20171121
1	1	CU2ZNTIS4/TX/BI/SA/KEYW/IN/PA

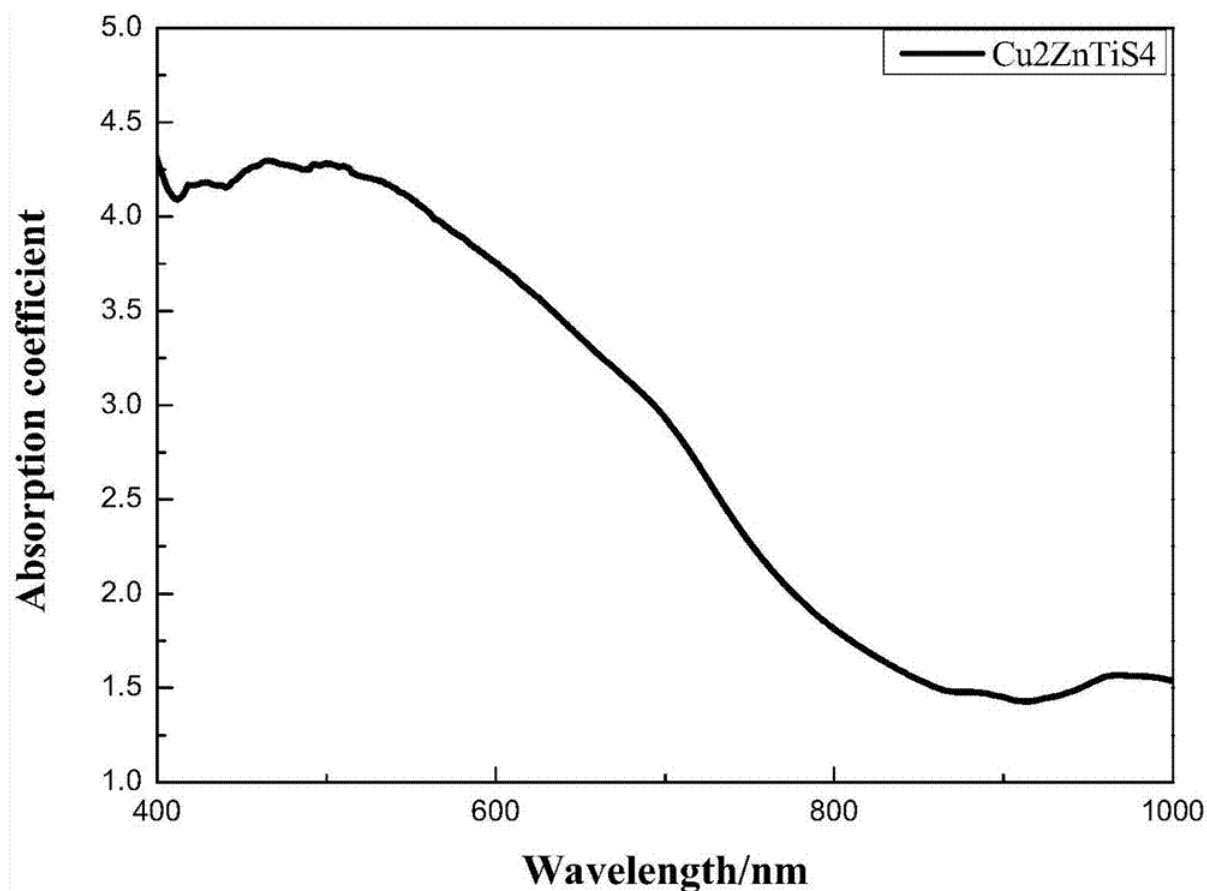
1 Document

Publication numbers	Title	Current assignees
CN105908132 A	Semiconductor Cu ₂ ZnTiS ₄ film material and preparation method thereof	CHANGZHOU UNIVERSITY

Family 1/1 - FAMPAT - ©Questel

Title

(CN105908132)

Semiconductor Cu₂ZnTiS₄ film material and preparation method thereof**Images****Publication data including kind & date**[CN105908132](#)

A

2016-08-31

CN105908132

[CN105908132](#)

B

2018-03-02

CN105908132B

**Abstract**

(CN105908132B)

The invention relates to the technical field of thin film solar cell preparation and especially relates to a novel semiconductor Cu₂ZnTiS₄ film material and a preparation method thereof. Through a magnetron sputtering multitarget deposition method, a CZTi precursor film is prepared on the surface of a soda-lime glass (SLG) substrate through three-target co-sputtering of Cu, Zn and Ti and the CZTi precursor film is subjected to thermal insulation in a H₂S atmosphere at a temperature of 510 DEG C for 2h so that a Cu₂ZnTiS₄ semiconductor film is obtained. The Cu₂ZnTiS₄ semiconductor film is a semiconductor film material with thickness of 200-2000nm, an optical absorption coefficient of 10cm, a carrier type P and ductility and has very important scientific significance and construction value for complete flexibility of a film material.

Search history

Search step	Result(s)	Query
4	28	3 AND PD<2017-11-21
3	32	((TITANIUM +OXIDE)/AB/ICLM/TI/TX AND (COPPER AND SULFID+ AND ZINC)/TI/AB/CLMS/DESC/ODES/ICLM/TX AND (MICROWAV+)/TI/AB/TX AND (CDS)/TI/AB/TX AND (SOLAR CELL+)/TI/AB/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (THIN 5W (LAYER+ OR WRAP+ OR FILM+ OR SHEET+))/TI/AB/OBJ/ADB/ICLM)
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28 Documents

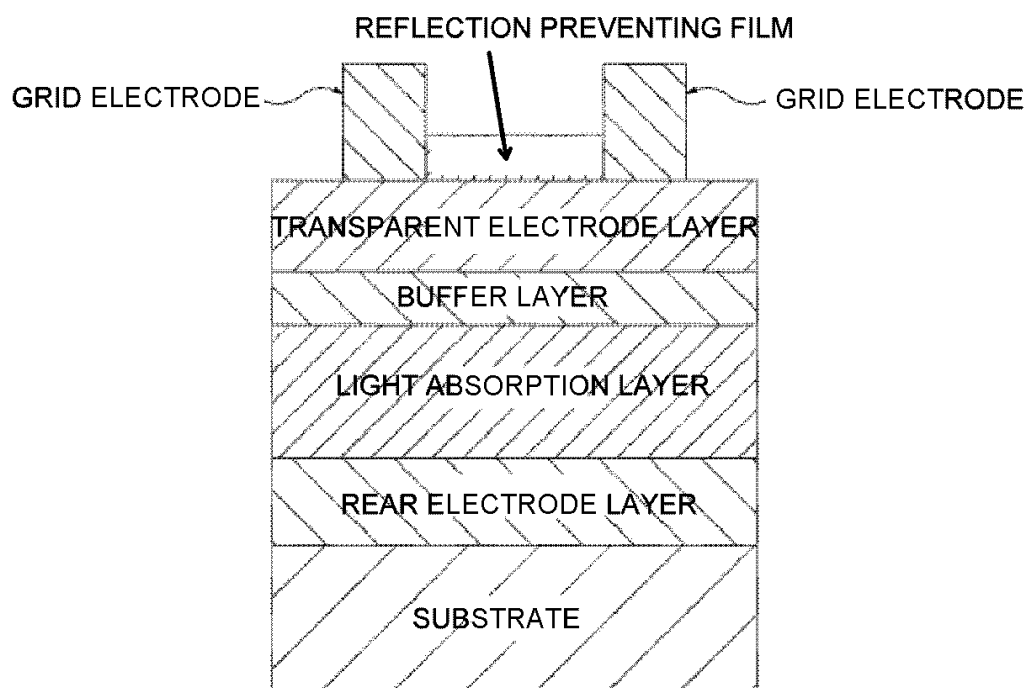
Publication numbers	Title	Current assignees
KR101503043 B1	Method for preparing light absorbing layer of thin-film solar cell, and thin-film solar cell using same	KOREA INSTITUTE OF ENERGY RESEARCH
WO200854542 A2	Hermetically sealed nonplanar solar cells	SOLYNDRA RESIDUAL TRUST
US20070215195 A1	Elongated photovoltaic cells in casings	SOLYNDRA RESIDUAL TRUST
KR101584072 B1	Non-vacuum process method of thin film using carbon layer as diffusion barrier film	KOREA INSTITUTE OF ENERGY RESEARCH
WO201113341 A1	Solar cell module	MITSUBISHI CHEMICAL, ...
WO2009149243 A1	A monitoring system based on etching of metals	JP LABORATORIES
WO200908393 A1	Method for producing nanoparticles by forced ultra-thin film rotary processing	M TECHNOLOGIES
US20160247927 A1	Tunnel thin film transistor with hetero-junction structure	QUALCOMM
WO200846058 A2	Nanowire-based transparent conductors and applications thereof	CHAMP GREAT INT L, ...
US20170250030 A1	Methods for forming a perovskite solar cell	UNIVERSITY OF LOUISVILLE RESEARCH FOUNDATION
EP1054456 A2	Protective sheet for solar battery module, method of fabricating the same and solar battery module	DAI NIPPON PRINTING
JP2012064645 A	Organic photoelectric conversion element and method for manufacturing the same	MITSUBISHI CHEMICALS
WO200920188 A1	Process for producing semiconductor fine particles and the fine particles	M TECHNOLOGIES
WO201206758 A1	Cluster photovoltaic system	LIU WENXIANG
JP2007073273 A	Photoelectric conversion element and its manufacturing method, photoelectric conversion element module, electronic equipment, movable body, power generation system, display, and its manufacturing method	SONY
US6335479 B1	Protective sheet for solar battery module, method of fabricating the same and solar battery module	DAI NIPPON PRINTING
JP2011155020 A	Photoelectric conversion element and method of manufacturing photocell	FUJIFILM
JP2010004869 A	Apparatus and method for raising organism	MITSUBISHI CHEMICAL
US20110214709 A1	Nanostructure and photovoltaic cell implementing same	ACADIA WOODS
CN101699748 A	Nano photovoltaic	LIU WENXIANG
WO2017149526 A2	A method and apparatus for cooperative usage of multiple distance meters	MAY PATENTS

Publication numbers	Title	Current assignees
JP2014044918 A	Photoelectric conversion element and solar battery	KONICA MINOLTA
WO2015159940 A1	Photoelectric conversion element	RICOH
WO200986161 A1	Transparent conductive coating with filler material	CLEARVIEW FILMS
US20010046081 A1	Sheet-shaped display, sphere-like resin body, and micro-capsule	FUJITSU
JP2001357896 A	Photoelectric conversion device and photo cell	FUJIFILM
JP2005085468 A	Photoelectric conversion element	KONICA MINOLTA MEDICAL & GRAPHIC
JP2003257509 A	Photovoltaic sheet as well as solar power generating unit and power generating device using it	TOIN GAKUEN SCHOOL

Family 1/28 - FAMPAT - ©Questel

Title
(WO2015160069)
Method for preparing light absorbing layer of thin-film solar cell, and thin-film solar cell using same

Images

**Publication data including kind & date**

KR101503043	B1	2015-03-25	KR101503043
WO2015160069	A1	2015-10-22	WO2015160069
CN106233470	A	2016-12-14	CN106233470
US20170033258	A1	2017-02-02	US20170033258
US10096739	B2	2018-10-09	US10096739

**Abstract**

(WO2015160069)

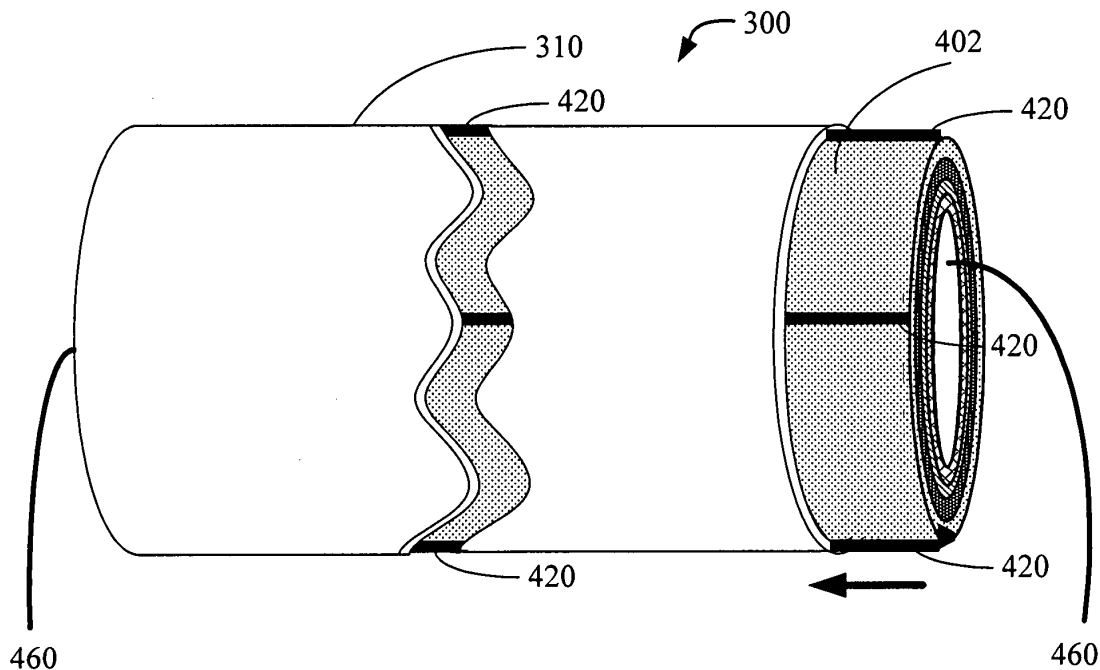
The present invention provides, in a method for preparing a transparent electrode for a solar cell, a method for preparing a light absorbing layer of a thin-film solar cell, comprising the steps of: (s100) preparing binary nanoparticles of a Group IB element-a Group VIA element; (s200) preparing a binary nanoparticle slurry of a Group IB element-a Group VIA element by adding a solution precursor, comprising a solvent, a binder and a Group VA element, to the binary nanoparticles of a Group IB element-a Group VIA element; (s300) dispersing and mixing the binary nanoparticle slurry of a Group IB element-a Group VIA element; (s400) coating the binary nanoparticle slurry of a Group IB element-a Group VIA element on a backside electrode layer (200); and (s500) heat treating the coated nanoparticle slurry while supplying a Group VIA element.

Family 2/28 - FAMPAT - ©Questel

Title
(EP2030246)

Hermetically sealed nonplanar solar cells

Images



Publication data including kind & date

WO2008054542	A2	2008-05-08	WO200854542
WO2008054542	A3	2008-09-04	WO200854542
EP2030246	A2	2009-03-04	EP2030246
CN101490852	A	2009-07-22	CN101490852
JP2009537985	A	2009-10-29	JP2009537985
US20100300532	A1	2010-12-02	US20100300532
US20100326429	A1	2010-12-30	US20100326429
JP2013243403	A	2013-12-05	JP2013243403
CN103456818	A	2013-12-18	CN103456818
CN101490852	B	2014-07-30	CN101490852B



Abstract

(EP2030246)

A nonplanar solar cell having a water vapor transmission rate of 10^{-4} g/m² day or less is provided. The nonplanar solar cell unit comprises a nonplanar substrate, a back- electrode disposed on the substrate, a semiconductor junction layer disposed on the back-electrode, and a transparent conductive layer disposed on the semiconductor junction. A transparent nonplanar tubular casing is disposed onto the nonplanar solar cell. A first sealant cap is hermetically sealed to a first end of the nonplanar tubular casing. A second sealant cap is hermetically sealed to a second end of the nonplanar tubular casing. In some instances, the solar cell unit is a monolithically integrated arrangement of solar cells. In some instances, the solar cell unit is a solar cell.

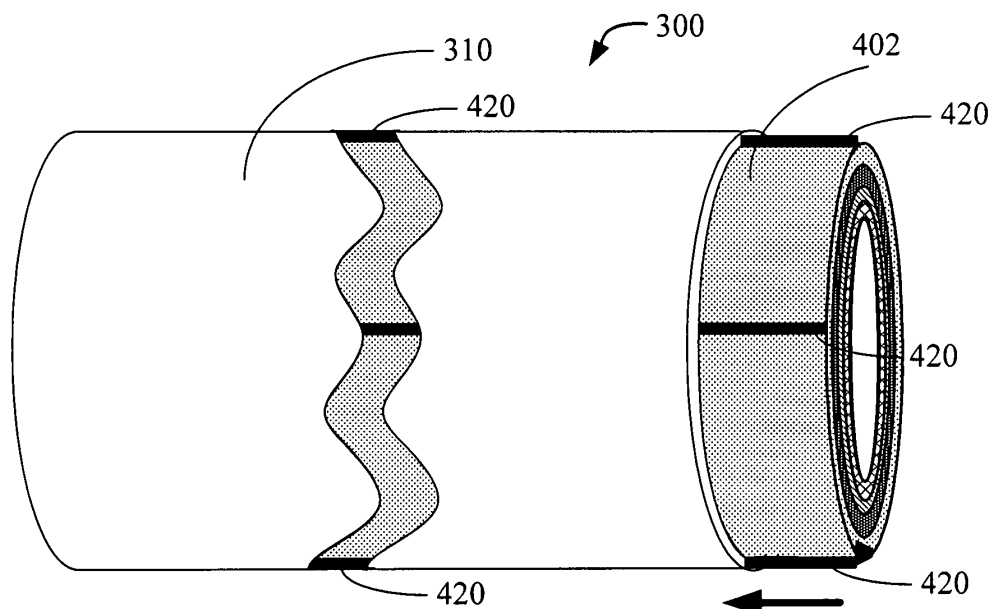
Family 3/28 - FAMPAT - ©Questel

Title

(EP1999798)

Elongated photovoltaic cells in casings

Images



Publication data including kind & date

US20070215195	A1	2007-09-20	US20070215195
WO2008060315	A2	2008-05-22	WO2008060315
WO2008060315	A3	2008-11-06	WO2008060315
EP1999798	A2	2008-12-10	EP1999798
US20080302415	A1	2008-12-11	US20080302415
KR20080112313	A	2008-12-24	KR20080112313
US20090007963	A1	2009-01-08	US20090007963
DE202007018756	U1	2009-03-26	DE202007018756
IN5587/CHENP/2008	A	2009-04-03	IN2008CN05587
CN101449386	A	2009-06-03	CN101449386
JP2009530852	A	2009-08-27	JP2009530852
US20110000534	A1	2011-01-06	US20110000534
CN101449386	B	2013-06-19	CN101449386B
JP2013175746	A	2013-09-05	JP2013175746
KR20130101159	A	2013-09-12	KR20130101159
US8742252	B2	2014-06-03	US8742252



Abstract

(EP1999798)

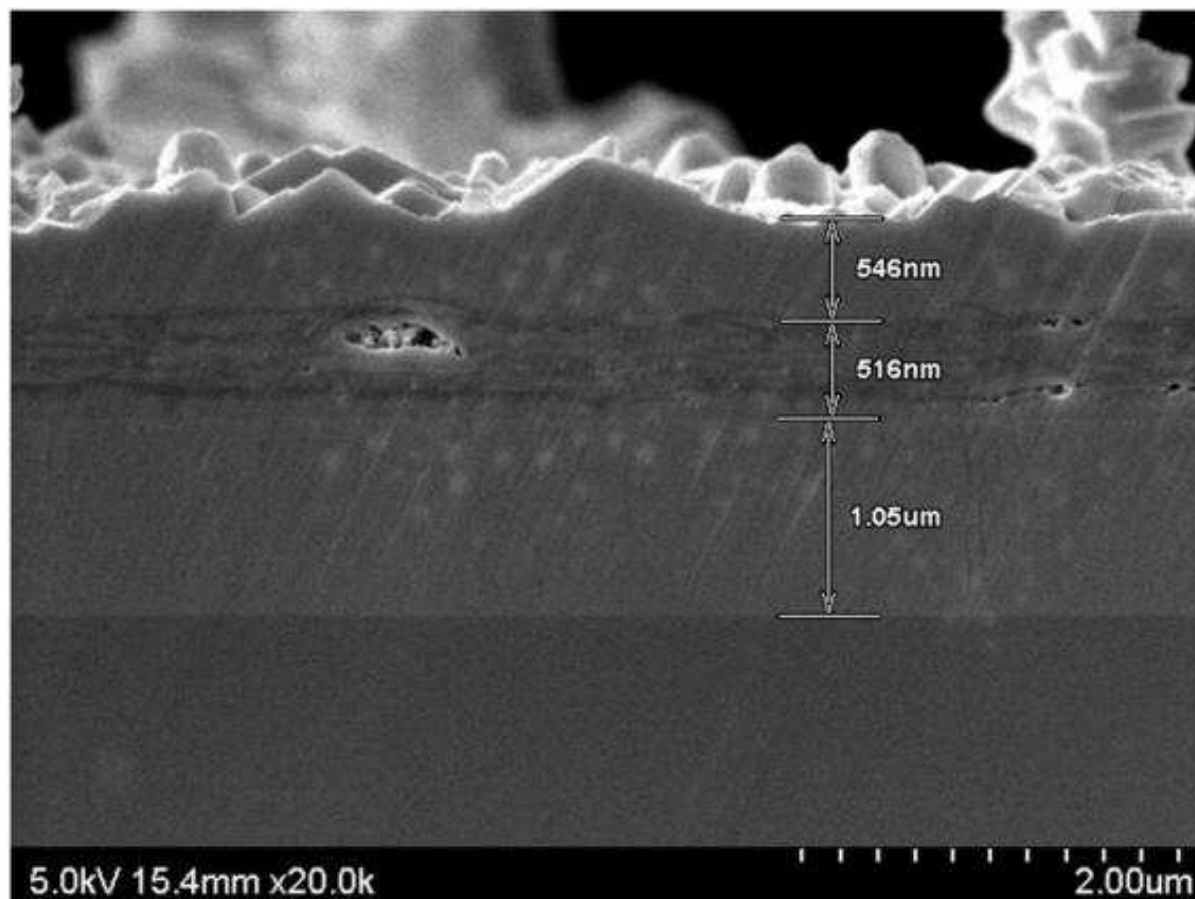
A solar cell unit comprising a solar cell and a transparent casing circumferentially disposed onto the cylindrical shaped solar cell is provided. The solar cell comprises a substrate, where at least a portion of the substrate is rigid and nonplanar. A back-electrode is circumferentially disposed on the substrate. A semiconductor junction layer is circumferentially disposed on the back-electrode. A transparent conductive layer is circumferentially disposed on the semiconductor junction.

Family 4/28 - FAMPAT - ©Questel

Title

(KR101584072)

Non-vacuum process method of thin film using carbon layer as diffusion barrier film

Images**Publication data including kind & date**[KR101584072](#)

B1 2016-01-12

KR101584072

**Abstract**

(KR101584072)

The present invention relates to a non-vacuum thin film forming method using a carbon layer as a diffusion barrier film to manufacture a light absorbing layer of a solar cell and, more specifically, relates to a method of generating the carbon layer between a Cl(G)S base and a molybdenum (Mo) layer when a Cl(G)S based thin film is formed to form the Cl(G)S based thin film functioning as a role of a diffusion barrier film which prevents diffusion of several ions come up from a substrate; and a solar cell using the same.

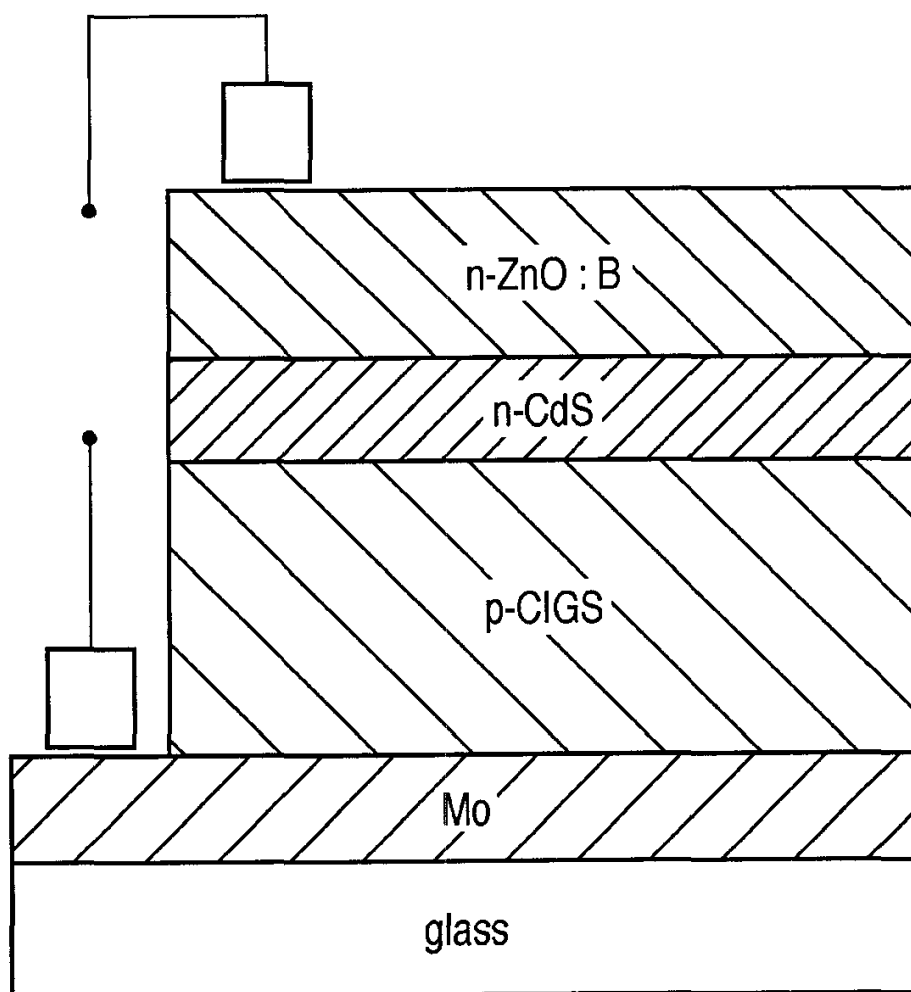
Family 5/28 - FAMPAT - ©Questel

Title

(EP2461369)

Solar cell module

Images



Publication data including kind & date

WO2011013341	A1	2011-02-03	WO201113341
TW201133893	A	2011-10-01	TW201133893
KR20120039707	A	2012-04-25	KR20120039707
CN102473774	A	2012-05-23	CN102473774
US20120125437	A1	2012-05-24	US20120125437
EP2461369	A1	2012-06-06	EP2461369
JPWO2011013341	A1	2013-01-07	JP2011013341W



Abstract

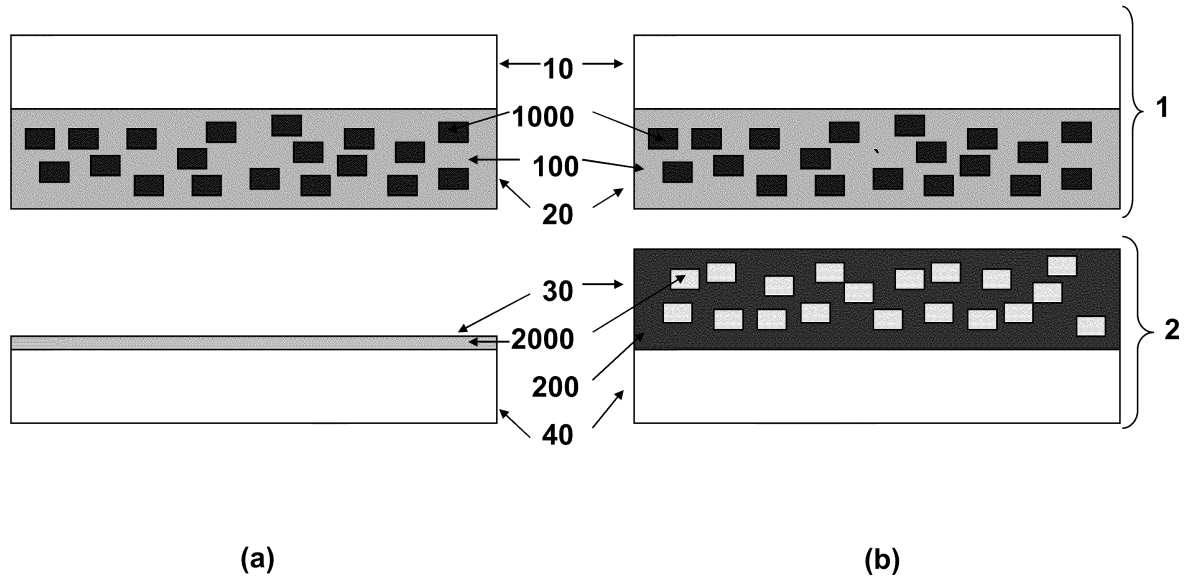
(EP2461369)

A solar cell module including a thin-film solar cell element protected with a novel gas barrier film is provided. The solar cell module includes a laminate obtained by laminating a gas barrier film on a layer including at least a solar cell element. The gas barrier film is obtained by laminating at least a substrate film, weather-resistant coating layer, and inorganic thin film layer. The weather-resistant coating layer is made of at least one of (a) a material obtained by crosslinking modified polyvinyl alcohol, (b) a material obtained by crosslinking polycaprolactone polyol and/or a material obtained by crosslinking polycarbonate polyol, and (c) an acrylic polymer having at least one group selected from the group consisting of an UV-stabilizing group, UV-absorbing group, and cycloalkyl group. The solar cell element is a thin-film solar cell element.

(EP3293493)

A monitoring system based on etching of metals

Images



Publication data including kind & date

WO2009149243	A1	2009-12-10	WO2009149243
US20090301382	A1	2009-12-10	US20090301382
CA2726993	A1	2009-12-10	CA2726993
AU2009256212	A1	2009-12-10	AU2009256212
IL209734	A	2011-02-28	IL-209734
EP2288879	A1	2011-03-02	EP2288879
CN102077060	A	2011-05-25	CN102077060
JP2011530085	A	2011-12-15	JP2011530085
ZA201009026	B	2012-01-25	ZA201009026
KR20120010557	A	2012-02-03	KR20120010557
RU2010154102	A	2012-07-20	RU2010154102
IN2749/MUMNP/2010	A	2012-08-31	IN2010MN02749
US8343437	B2	2013-01-01	US8343437
RU2507516	C2	2014-02-20	RU2507516
CN102077060	B	2014-10-29	CN102077060B
EP2288879	A4	2015-08-19	EP2288879
JP5833920	B2	2015-11-06	JP5833920
AU2009256212	B2	2015-12-10	AU2009256212
IL209734	B	2016-05-31	IL-209734
AU2016202637	A1	2016-06-09	AU2016202637
KR101655144	B1	2016-09-07	KR101655144
BRPI0913415	A1	2017-05-30	BRPI0913415
AU2017265092	A1	2017-12-14	AU2017265092
EP2288879	B1	2018-01-24	EP2288879
EP3293493	A1	2018-03-14	EP3293493
BRPI0913415	A2	2019-04-02	BRPI0913415



Abstract

(EP3293493)

Compositions, devices and processes related to etching of a very thin layer or fine particles of a metal are disclosed for

monitoring a variety of parameters, such as time, temperature, time-temperature, thawing, freezing, microwave, humidity, ionizing radiation, sterilization and chemicals. These devices have capabilities of producing a long and sharp induction period of an irreversible visual change. The devices are composed of an indicator comprising a very thin layer of a metal (e g, polyester film having an extremely thin, e g, about one hundred Angstroms layer of aluminum) and an activator, e g, a reactant, such as water, water vapor, an acid, a base, oxidizing agent or their precursors, which is capable of reacting with the said indicator. The indicator retains its opacity and metallic luster, e g, silvery white, mirror like finish of aluminum layer for a long time. The activator destroys the indicator layer including the naturally formed oxide layer.

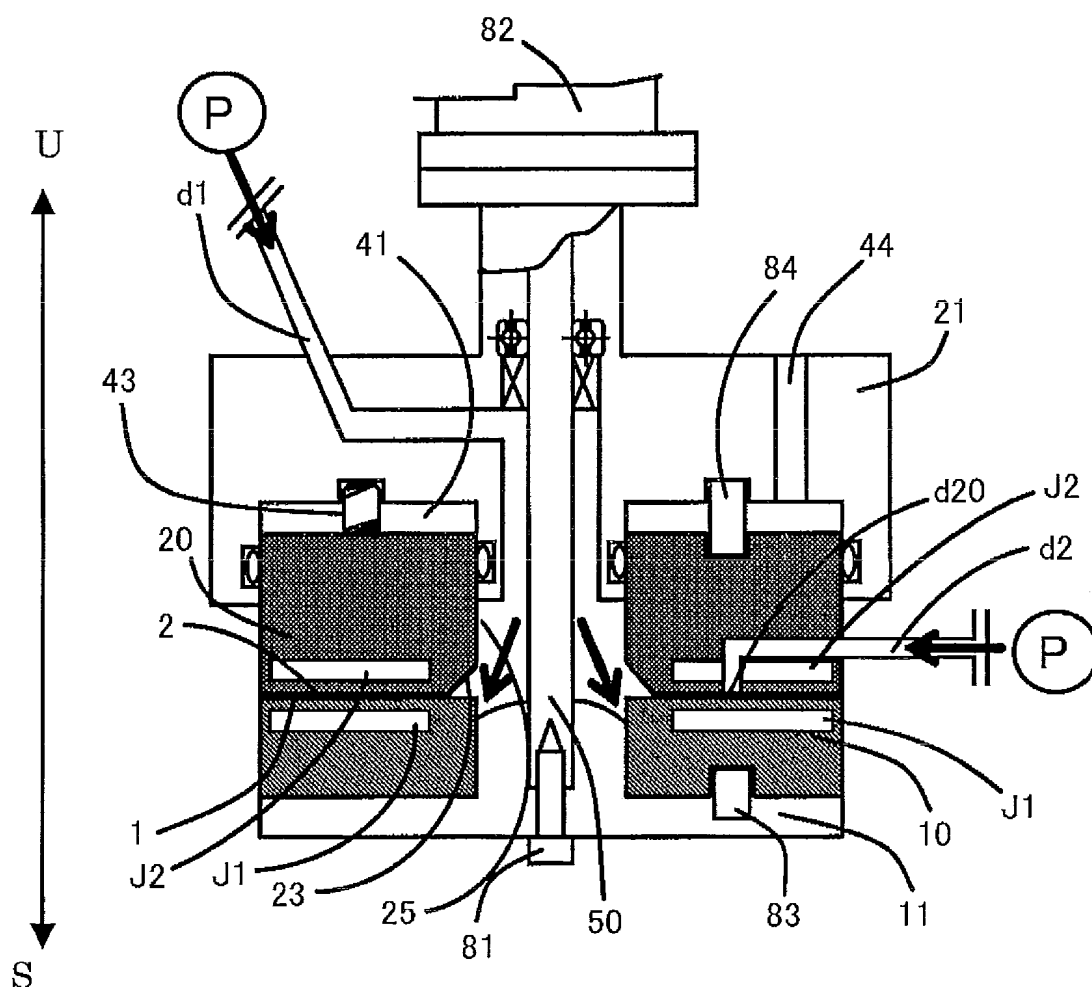
Family 7/28 - FAMPAT - ©Questel

Title

(EP2184109)

Method for producing nanoparticles by forced ultra-thin film rotary processing

Images



Publication data including kind & date

WO2009008393	A1	2009-01-15	WO2009008393
JPWO2009008393	A1	2009-01-15	JP2009008393W
JP2009082902	A	2009-04-23	JP2009082902
TW200918156	A	2009-05-01	TW200918156
KR20100022093	A	2010-02-26	KR20100022093
EP2184109	A1	2010-05-12	EP2184109
US20100155310	A1	2010-06-24	US20100155310
CN101795772	A	2010-08-04	CN101795772
JP4817154	B2	2011-09-09	JP4817154
JP2011189348	A	2011-09-29	JP2011189348



CN102516809	A	2012-06-27	CN102516809				
EP2184109	A4	2012-12-26	EP2184109				
CN101795772	B	2013-09-18	CN101795772B				
JP5500597	B2	2014-03-20	JP5500597				
KR101402734	B1	2014-06-02	KR101402734				
TWI441672	B	2014-06-21	TWI441672				
CN102516809	B	2015-04-01	CN102516809B				
US9211510	B2	2015-12-15	US9211510				
EP2184109	B1	2017-08-23	EP2184109				

Abstract

(EP2184109)

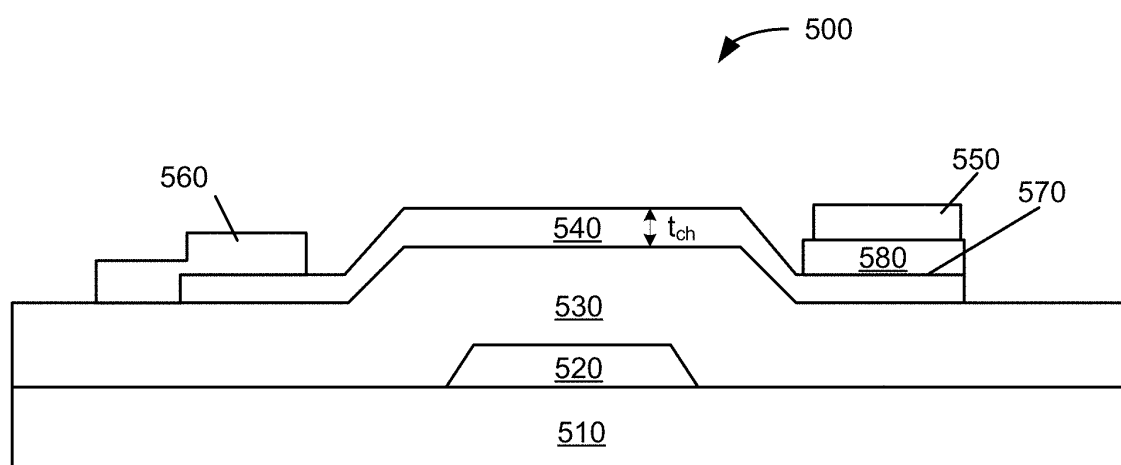
The present invention provides a method for producing nanoparticles, which comprises maintaining a minute space of 1 mm or less between two processing surfaces capable of approaching to and separating from each other and being rotating relative to each other, allowing the minute space maintained between the two processing surfaces to serve as a flow path of a processed fluid thereby forming a forced thin film of the processed fluid and separating nanoparticles in the forced thin film.

Family 8/28 - FAMPAT - ©Questel

Title

(EP3262692)

Tunnel thin film transistor with hetero-junction structure

Images**Publication data including kind & date**

US20160247927	A1	2016-08-25	US20160247927				
WO2016137668	A1	2016-09-01	WO2016137668				
TW201705488	A	2017-02-01	TW201705488				
US9761732	B2	2017-09-12	US9761732				
CN107210320	A	2017-09-26	CN107210320				
EP3262692	A1	2018-01-03	EP3262692				
JP2018511936	A	2018-04-26	JP2018511936				
TWI626750	B	2018-06-11	TWI626750				
JP6363802	B2	2018-07-25	JP6363802				

Abstract

(EP3262692)

This disclosure provides thin film transistors (TFTs) including p-n heterojunction structures. A p-n hetero-junction structure may include a junction between a narrow bandgap material and a wide bandgap material. The narrow bandgap material, which may be an oxide, nitride, selenide, or sulfide, is the active channel material of the TFT and may provide relatively high carrier mobility. The hetero-junction structures facilitate band-to-band tunneling and suppression of TFT off-currents. In various implementations, the TFTs may be formed on flexible substrates and have low temperature processing capabilities.

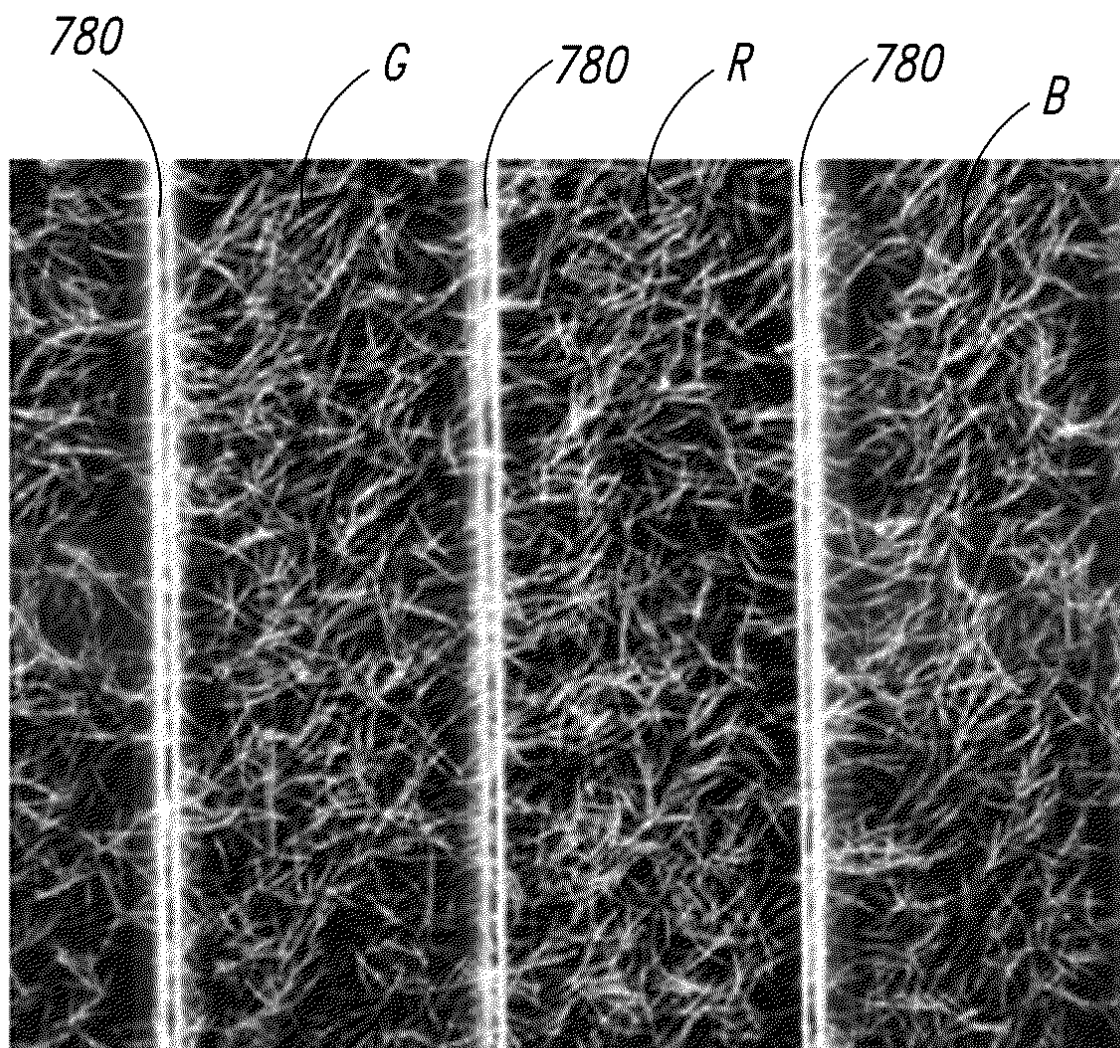
Family 9/28 - FAMPAT - ©Questel

Title

(EP2082436)

Nanowire-based transparent conductors and applications thereof

Images



Publication data including kind & date

WO2008046058	A2	2008-04-17	WO200846058
US20080143906	A1	2008-06-19	US20080143906
TW200839794	A	2008-10-01	TW200839794
WO2008046058	A3	2008-10-16	WO200846058
SG151667	A1	2009-05-29	SG-151667
EP2082436	A2	2009-07-29	EP2082436
KR20090112626	A	2009-10-28	KR20090112626
CN101589473	A	2009-11-25	CN101589473
SG156217	A1	2009-11-26	SG-156217
JP2010507199	A	2010-03-04	JP2010507199



US20100243295	A1	2010-09-30	US20100243295				
US20110088770	A1	2011-04-21	US20110088770				
US8018568	B2	2011-09-13	US8018568				
CN101589473	B	2011-10-05	CN101589473B				
SG175612	A1	2011-11-28	SG-175612				
US20110297642	A1	2011-12-08	US20110297642				
US8094247	B2	2012-01-10	US8094247				
US8174667	B2	2012-05-08	US8174667				
SG180278	A1	2012-05-30	SG-180278				
JP5409369	B2	2013-11-15	JP5409369				
JP2014003298	A	2014-01-09	JP2014003298				
TWI426531	B	2014-02-11	TWI426531				
US8760606	B2	2014-06-24	US8760606				
TW201440080	A	2014-10-16	TW201440080				
US20140338735	A1	2014-11-20	US20140338735				
SG10201502808U	A	2015-05-28	SG10201502808U				
JP5785226	B2	2015-07-31	JP5785226				
KR101545219	B1	2015-08-18	KR101545219				
JP2016012726	A	2016-01-21	JP2016012726				
TWI576866	B	2017-04-01	TWI576866				
JP6130882	B2	2017-05-17	JP6130882				

Abstract

(EP2082436)

A transparent conductor including a conductive layer coated on a substrate is described. More specifically, the conductive layer comprises a network of nanowires that may be embedded in a matrix. The conductive layer is optically clear, patternable and is suitable as a transparent electrode in visual display devices such as touch screens, liquid crystal displays, plasma display panels and the like.

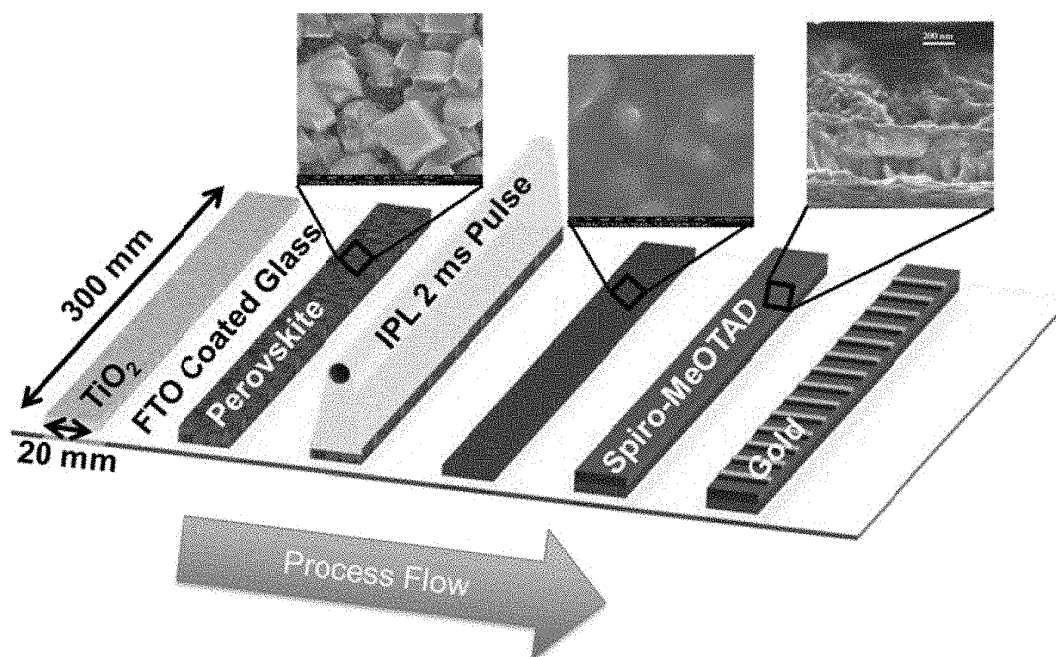
Family 10/28 - FAMPAT - ©Questel

Title

(US20190051830)

Methods for forming a perovskite solar cell

Images



Publication data including kind & date

[US20170250030](#) A1 2017-08-31 US20170250030

[US20190051830](#) A1 2019-02-14 US20190051830



Abstract

(US20190051830)

A perovskite thin film and method of forming a perovskite thin film are provided. The perovskite thin film includes a substrate, a hole blocking/electron transport layer, and a sintered perovskite layer. The method of forming the perovskite solar cell includes depositing a perovskite layer onto a substrate and processing (for example, by sintering) the perovskite layer with intense pulsed light to initiate a radiative thermal response that is enabled by an alkyl halide additive.

Family 11/28 - FAMPAT - ©Questel

Title

(EP1054456)

Protective sheet for solar battery module, method of fabricating the same and solar battery module

Images

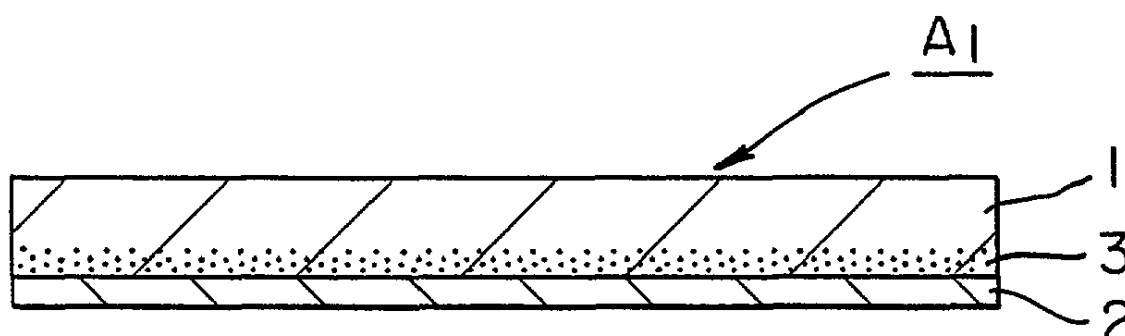
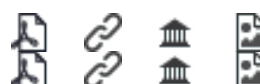


FIG. 2

Publication data including kind & date

[EP1054456](#) A2 2000-11-22 EP1054456



[EP1054456](#)

A3 2007-01-03 EP1054456

Abstract

(EP1054456)

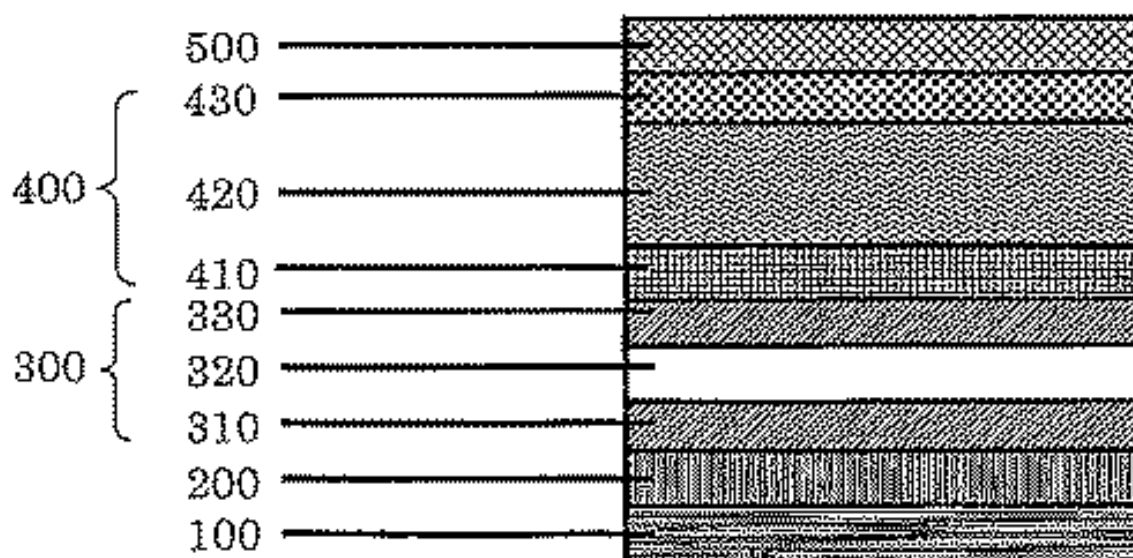
A protective sheet for a solar battery module comprises a weather-resistant sheet (1) of, for example, a fluorocarbon resin, and a deposited inorganic oxide thin film (2) formed on one of the surfaces of the weather-resistant sheet (1). A surface-treated layer (3) is formed in the weather-resistant sheet (1) to enhance adhesion between the weather-resistant sheet (1) and the deposited inorganic oxide thin film (2).

Family 12/28 - FAMPAT - ©Questel

Title

(JP2012064645)

Organic photoelectric conversion element and method for manufacturing the same

Images**Publication data including kind & date**[JP2012064645](#)

A 2012-03-29 JP2012064645

**Abstract**

(JP2012064645)

PROBLEM TO BE SOLVED: To provide a light-weight and large-area organic photoelectric conversion element with high power generation efficiency and high durability by restraining the deterioration of a transparent electrode in the organic photoelectric conversion element caused by high-temperature treatment at around 150 degrees, improving high adhesiveness between a transparent plastic substrate and the transparent electrode, and by restraining the penetration of at least one of water vapor and oxygen of the transparent plastic substrate. **SOLUTION:** In the organic photoelectric conversion element in which at least the transparent plastic substrate, the transparent electrode, an organic semiconductor layer, and a counter electrode are layered in the order, the transparent electrode is formed by layering at least a transparent conductive thin-film layer, a metal thin-film layer and a transparent conductive thin-film layer in the order. In addition, a barrier layer is provided between the substrate and the transparent electrode.

Family 13/28 - FAMPAT - ©Questel

Title

(EP3106227)

Process for producing semiconductor fine particles and the fine particles

Images

Abstract

(EP3106227)

It is an object to provide a method for producing compound semiconductor particles in which monodisperse compound semiconductor particles can be prepared according to the intended object, clogging with products does not occur due to self-dischargeability, a large pressure is not necessary, and productivity is high. In producing compound semiconductor particles by separating and precipitating, in a fluid, semiconductor raw materials, the fluid is formed into a thin film fluid between two processing surfaces arranged so as to be able to approach to and separate from each other, at least one of which rotates relative to the other, and the semiconductor raw materials are separated and precipitated in the thin film fluid. Further, in producing semiconductor microparticles containing semiconductor elements by reacting a compound containing semiconductor elements, in a fluid, with a reducing agent, the fluid is formed into a thin film fluid between two processing surfaces arranged so as to be able to approach to and separate from each other, at least one of which rotates relative to the other, and the compound containing semiconductor elements is reacted with the reducing agent in the thin film fluid.

Family 14/28 - FAMPAT - ©Questel

Title

(WO201206758)

Cluster photovoltaic system

Images

$$\delta = 23.45^{\circ} \sin (360^{\circ} (284 + N_o) / 365))$$

Publication data including kind & date[WO2012006758](#)

A1 2012-01-19 WO201206758

**Abstract**

(WO201206758)

Three kinds of cluster photovoltaic systems are provided, comprising: a common cluster photovoltaic system established by a photovoltaic circuit and a cluster photocell which is irradiated by lights directly; a direct cluster photovoltaic system established by a photovoltaic circuit and a cluster photocell which is irradiated by the lights gathered by a refraction convex lens or a reflection concave mirror; and a transmission cluster photovoltaic system established by a photovoltaic circuit and a cluster photocell which is irradiated by lights that are gathered by a refraction convex lens or a reflection concave mirror and then transmitted in curve for a certain distance in a transmission optical fiber. The key portion of the cluster photocell is PN junction which can be formed by coating a very thin negative type layer on the surface of a thin sheet of P-type silicon mono-ordered crystal with the thickness of 0.3-0.5mm, using the diffusion method to form a N-type layer for example. After that, the cluster photocell is formed by adding an electrode on each side of the PN junction respectively. When the cluster photocell is irradiated by lights, voltage and current will be generated between the two electrodes. The discovery of the cluster exposes the essence of mesocopy matter.

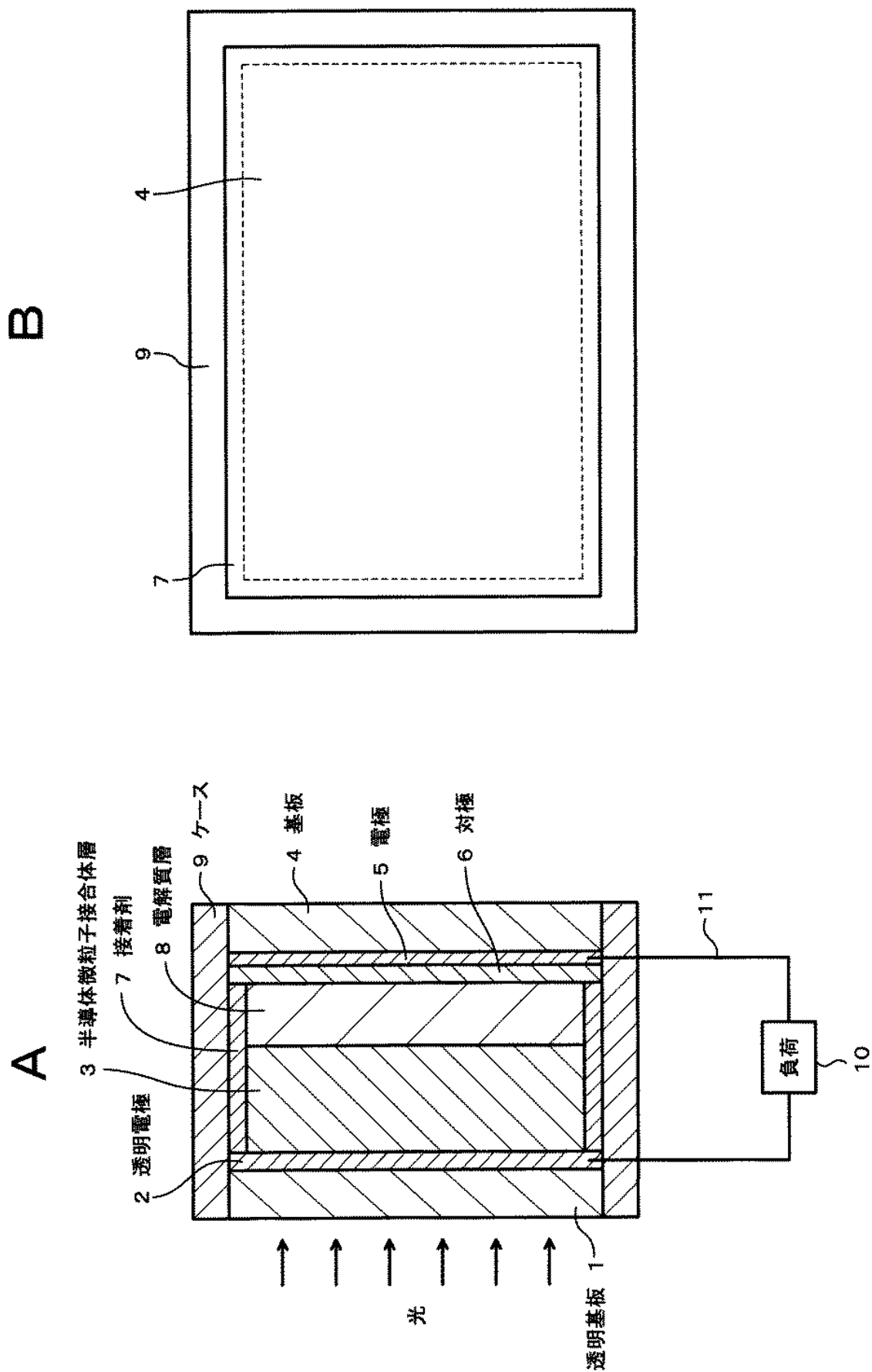
Family 15/28 - FAMPAT - ©Questel

Title

(JP2007073273)

Photoelectric conversion element and its manufacturing method, photoelectric conversion element module, electronic equipment, movable body, power generation system, display, and its manufacturing method

Images



Publication data including kind & date

JP2007073273

A 2007-03-22

JP2007073273

JP4887694

B2 2011-12-22

JP4887694



Abstract

(JP4887694)

PROBLEM TO BE SOLVED: To provide a photoelectric conversion element such as a dye-sensitized solar cell, capable of obtaining stable photoelectric conversion characteristics for a long time and high process compatibility, and to provide the manufacturing method of the photoelectric conversion element.

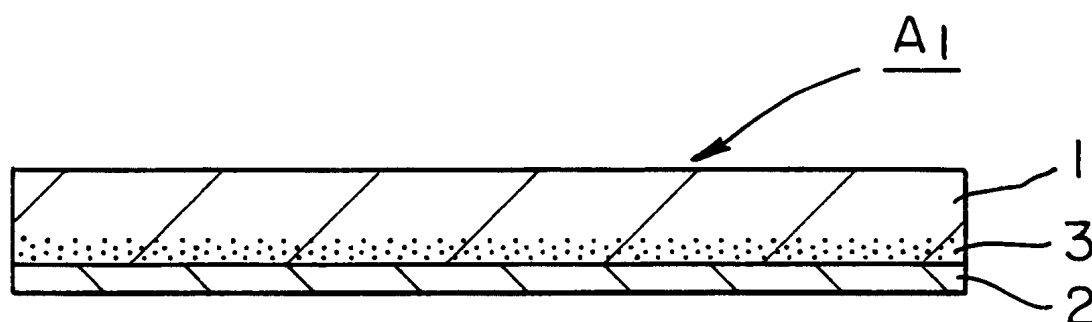
SOLUTION: A transparent electrode 2 and a semiconductor fine particle joint body layer 3 which is a semiconductor electrode are formed on a transparent substrate 1. An electrode 5 and a counter electrode 6 are formed on a substrate 4. A first component and a second component of a non-mixture type two-component adhesive are applied to the peripheral part of the transparent electrode 2 and the peripheral part of the counter electrode 6, the transparent substrate 1 and the substrate 4 are stuck together so that the first component and the second component contact each other. An electrolyte is poured in a space between the semiconductor fine particle joint body layer 3 and the counter electrode 6 to form an electrolyte layer 8, and the dye-sensitized solar cell is manufactured.

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Family 16/28 - FAMPAT - ©Questel

Title
(US7309831)
Protective sheet for solar battery module, method of fabricating the same and solar battery module

Images



Publication data including kind & date

US6335479	B1	2002-01-01	US6335479
US20020050287	A1	2002-05-02	US20020050287
US6465726	B2	2002-10-15	US6465726
US20030051751	A1	2003-03-20	US20030051751
US6777610	B2	2004-08-17	US6777610
US20040229394	A1	2004-11-18	US20040229394
US7309831	B2	2007-12-18	US7309831



Abstract

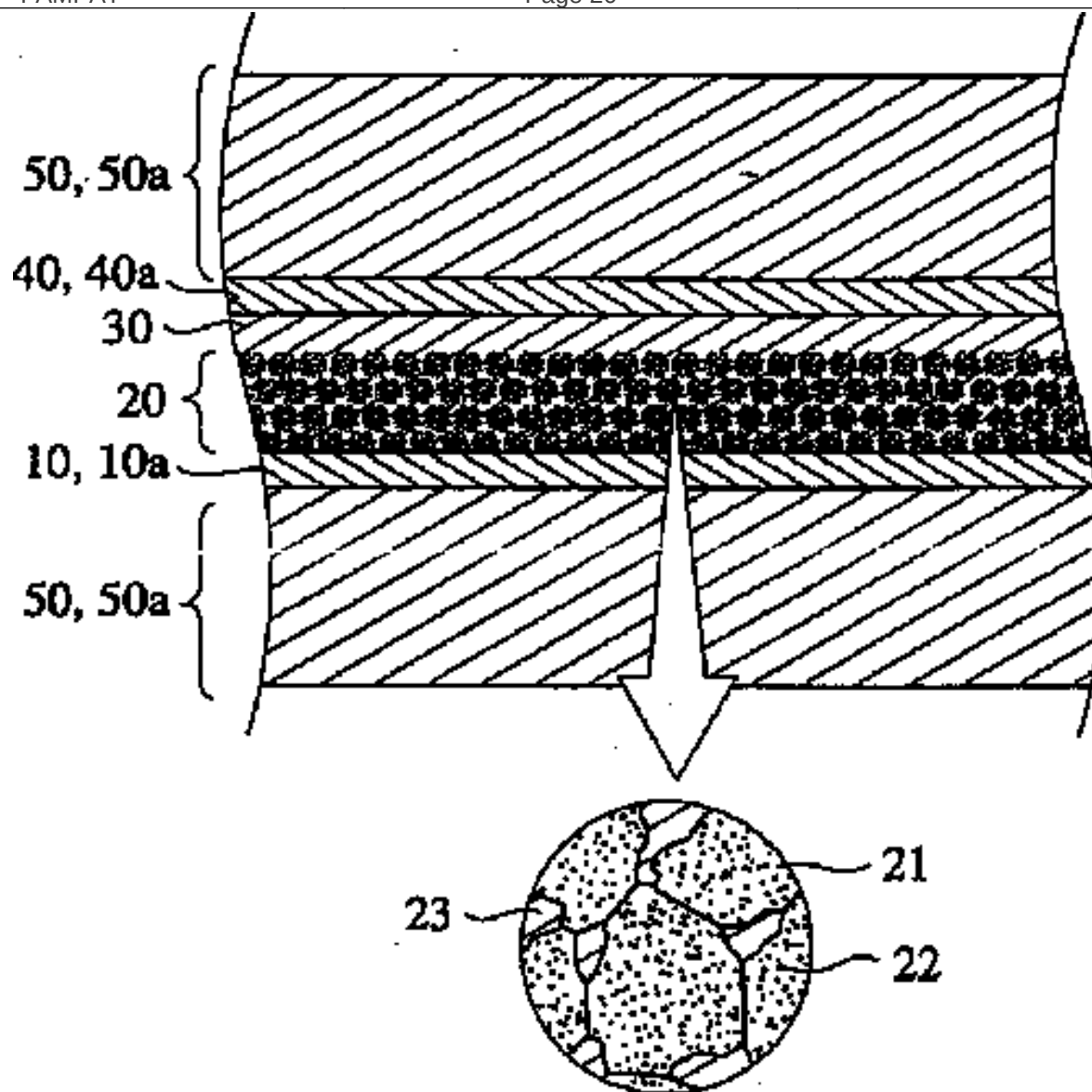
(US7309831)

A protective sheet for a solar battery module comprises a weather-resistant sheet (1) of, for example, a fluorocarbon resin, and a deposited inorganic oxide thin film (2) formed on one of the surfaces of the weather-resistant sheet (1). A surface-treated layer (3) is formed in the weather-resistant sheet (1) to enhance adhesion between the weather-resistant sheet (1) and the deposited inorganic oxide thin film (2).

Family 17/28 - FAMPAT - ©Questel

Title
(JP2011155020)
Photoelectric conversion element and method of manufacturing photocell

Images



Publication data including kind & date

JP2011155020	A	2011-08-11	JP2011155020
JP5449252	B2	2014-01-10	JP5449252



Abstract

(JP5449252)

PROBLEM TO BE SOLVED: To provide a dye-sensitized photoelectric conversion element excellent in photoelectric conversion efficiency, and also provide a photoelectric conversion element using a flexible support, a photoelectric conversion element with a high efficiency of energy collection efficiency necessary for manufacturing, and a photocell using the same.

SOLUTION: The photoelectric conversion element and the photocell are constituted by semiconductor fine particle film manufactured by any one or combination of: irradiation of an ultraviolet ray no more than 400 nm; heating to 50-350°C; vacuum of 0.05 MPa or less; irradiation of a microwave and/or an infrared ray of which absorbance is owned by at least a water molecule; exposure to a high electric field and/or a high magnetic field; application of a high current; exposure to an oxidation and reduction atmosphere and/or an ozone atmosphere; and coexistence with a semiconductor fine particle precursor.

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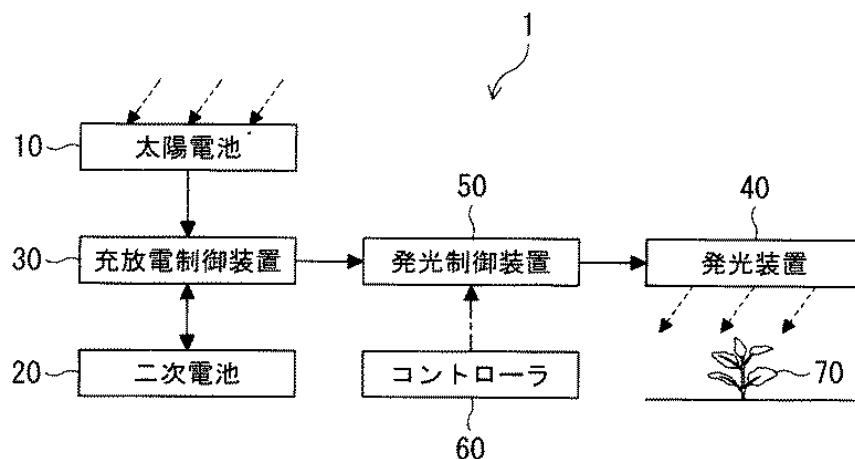
Family 18/28 - FAMPAT - ©Questel

Title

(JP2010004869)

Apparatus and method for raising organism

Images



Publication data including kind & date

JP2010004869

A 2010-01-14 JP2010004869



Abstract

(JP2010004869)

PROBLEM TO BE SOLVED: To provide an apparatus for efficiently raising organisms at low cost. SOLUTION: This apparatus for raising organisms 70 by irradiating the organisms 70 with light is composed of: a solar battery 10 which receives light and generates electricity; a light source 40 which emits light by being supplied with electricity generated with the solar battery 10, and irradiates the organisms 70 with light; and a light emission control means 50 which changes with time, the intensity and/or wavelength of light to be irradiated to the organisms 70 from the light source 40. COPYRIGHT: (C)2010,JPO&INPIT

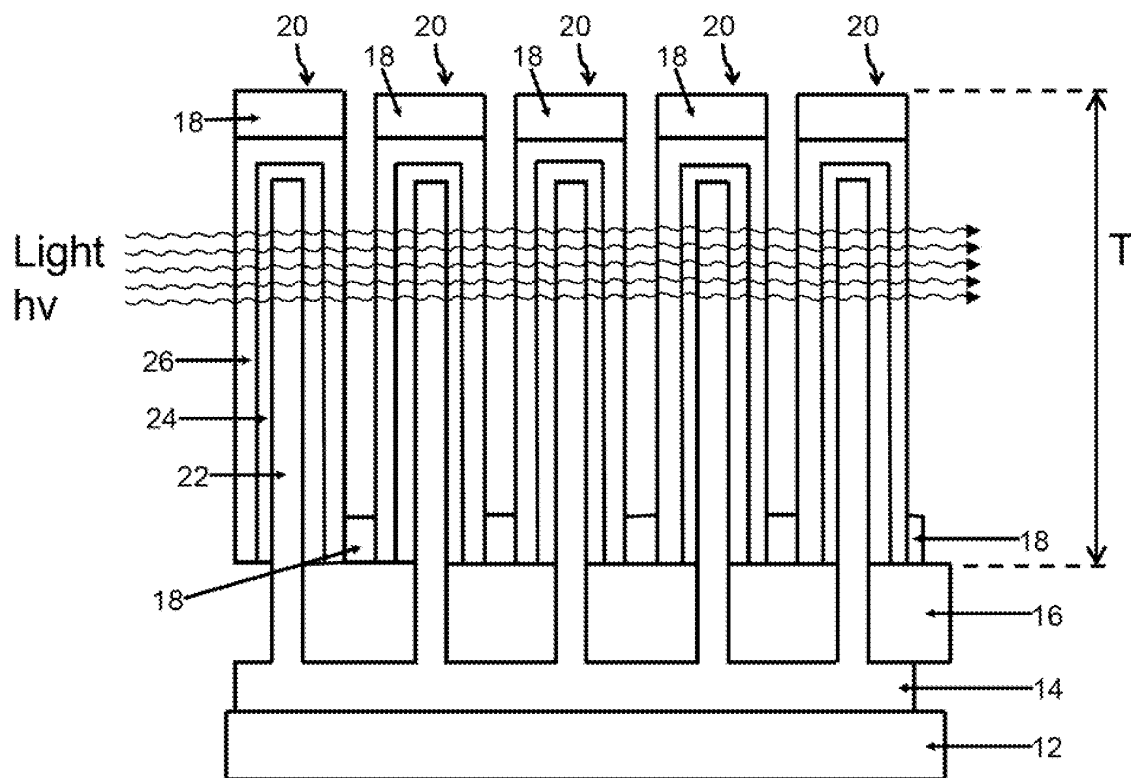
Family 19/28 - FAMPAT - ©Questel

Title

(EP2887404)

Nanostructure and photovoltaic cell implementing same

Images



Publication data including kind & date

US20110214709	A1	2011-09-08	US20110214709
WO2011109644	A1	2011-09-09	WO2011109644
SG182519	A1	2012-08-30	SG-182519
EP2543078	A1	2013-01-09	EP2543078
JP2013521662	A	2013-06-10	JP2013521662
KR20130084218	A	2013-07-24	KR20130084218
EP2543078	A4	2014-08-13	EP2543078
SG10201501551W	A	2015-04-29	SG10201501551W
EP2887404	A1	2015-06-24	EP2887404
US9202954	B2	2015-12-01	US9202954



Abstract

(EP2887404)

Nanostructures and photovoltaic structures are disclosed. Methods for creating nanostructures are also presented.

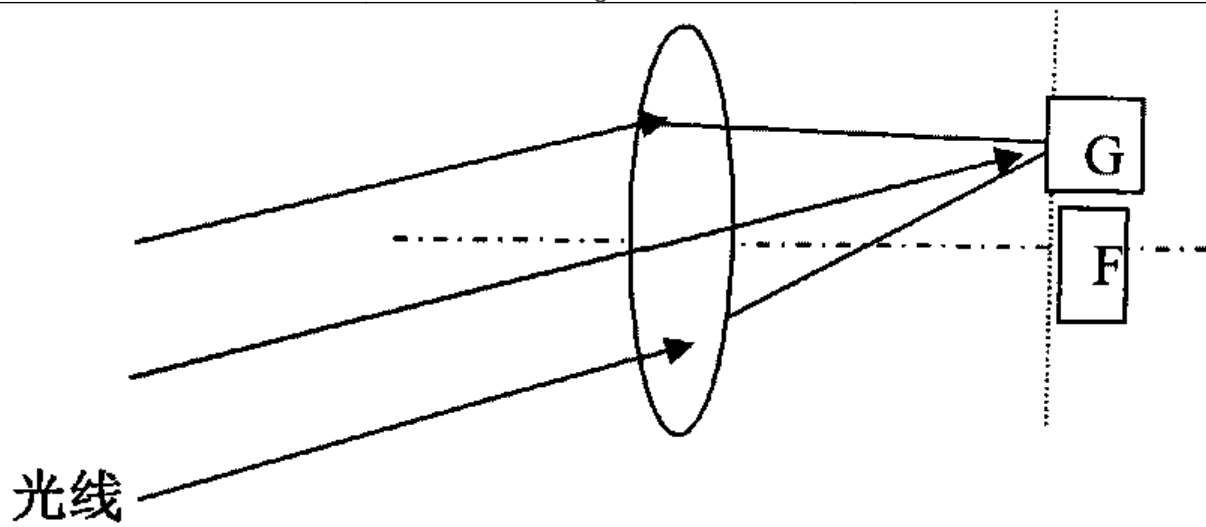
Family 20/28 - FAMPAT - ©Questel

Title

(CN101699748)

Nano photovoltaic

Images

**Publication data including kind & date**[CN101699748](#)

A

2010-04-28

CN101699748

**Abstract**

(CN101699748)

The invention relates to a nano photovoltaic system. A formula of photovoltage U light is deduced; light concentrating surfaces of lenses or concave mirrors and the like concentrate energy directly radiated by a light source (sunlight and the like), and the light energy is directly converted into electric energy by an optoelectronic conversion device. The system has a heat absorbing area smaller than a light concentrating area, so heat loss is small, and the heat can be concentrated in high power and high efficiency. A device structure of the system comprises two types, namely tracking or non-tracking. In addition, light concentrated can be transmitted to the other end of an optical fiber from one end of the optical fiber. By utilizing the function of transmitting the light of the optical fiber, various energy-concentrating photovoltaic systems for concentrating solar energy can be built for factory production. The invention also provides a nano photoelectric substrate, which is an organic/inorganic nano composite material formed by dispersing inorganic filler impurities in an organic polymer substrate (semiconductor) in nano size; and simultaneously, defects such as dispersity, intermittence, randomness and the like of the traditional photovoltaic solar power system are overcome.

Family 21/28 - FAMPAT - ©Questel

Title

(WO2017149526)

A method and apparatus for cooperative usage of multiple distance meters

Images

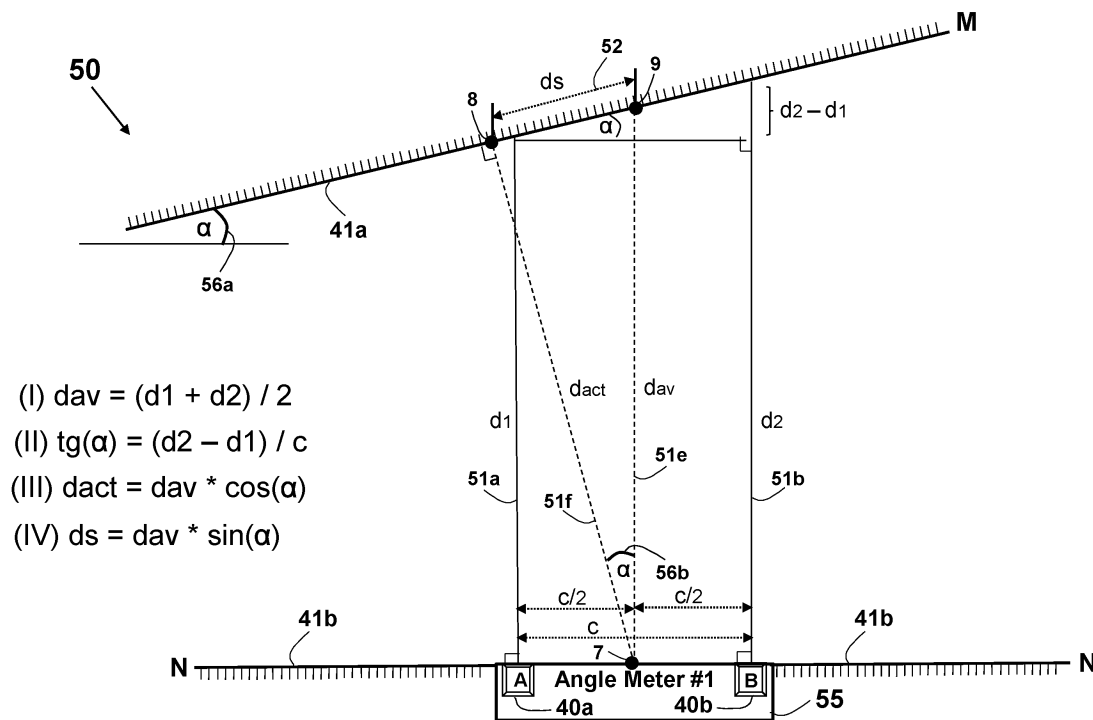


FIG. 5

Publication data including kind & date

WO2017/149526

A2 2017-09-08

WO2017149526

WO2017/149526

A3 2017-10-05

WO2017149526



Abstract

(WO2017149526)

A method and apparatus for an angle meter cooperatively using two or more non-contact distance meters for measuring distances to a surface along substantially parallel lines. The measured distances are used for estimating or calculating the angle to the surface and the distance to the surface. The distance meters may use optical means, where a visible or non-visible light or laser beam is emitted and received, acoustical means, where an audible or ultrasound sound is emitted and received, or an electro-magnetic scheme, where radar beam is transmitted and received. The distances may be estimated using a Time-of-Flight (TOF), homodyne or heterodyne phase detection schemes. The distance meters may share the same correlator, signal conditioning circuits, or the same sensor. Two or more angle meters may be used defining parallel or perpendicular measurement planes, for measuring angles between surfaces, and for estimating physical dimensions such as length, area or volume.

Family 22/28 - FAMPAT - ©Questel

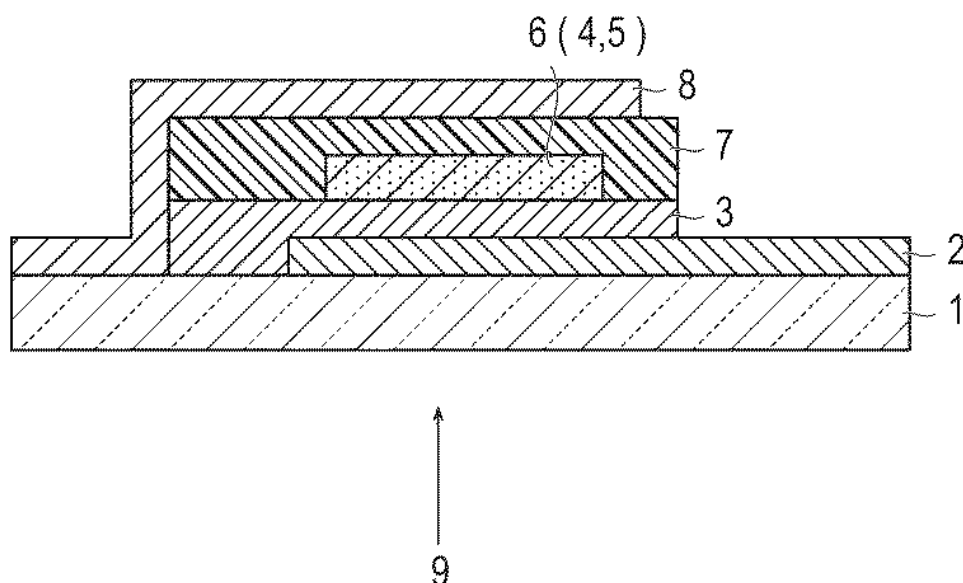
Title

(JP2014044918)

Photoelectric conversion element and solar battery

Images

10

**Publication data including kind & date**[JP2014044918](#)

A

2014-03-13

JP2014044918

**Abstract**

(JP2014044918)

PROBLEM TO BE SOLVED: To provide a full-solid dye-sensitized photoelectric conversion element and a solar battery having excellent photoelectric conversion efficiency and durability. **SOLUTION:** A photoelectric conversion element comprises: a base substance; a first electrode; a photoelectric conversion layer containing a semiconductor and a sensitization dye represented by the general formula (1); a solid hole transport layer containing a compound having a partial structure represented by the general formula (2) or a polymer formed by polymerizing a multimer of the compound; and a second electrode.

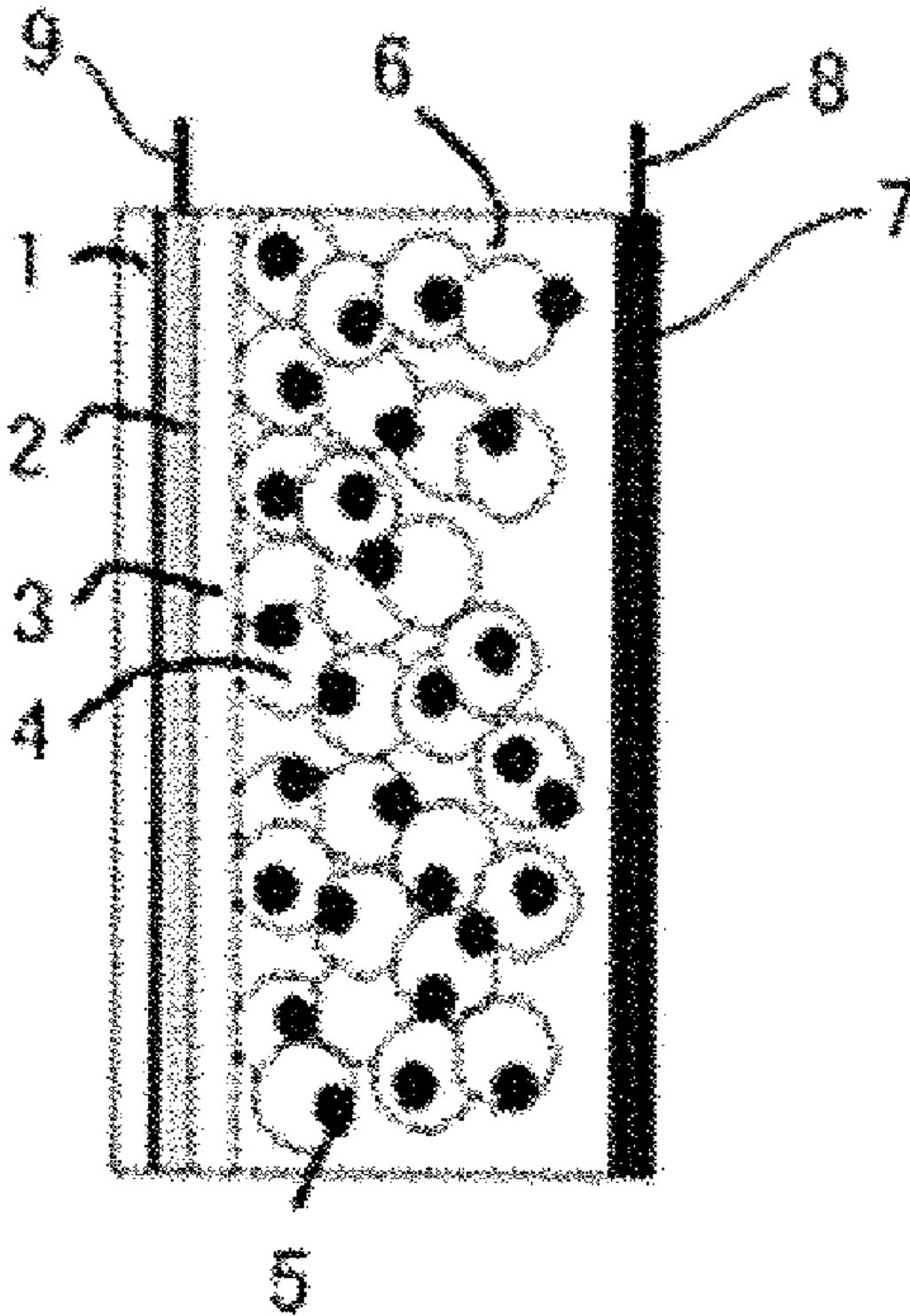
Family 23/28 - FAMPAT - ©Questel

Title

(EP3133657)

Photoelectric conversion element

Images



Publication data including kind & date

WO2015159940	A1	2015-10-22	WO2015159940
CN106463624	A	2017-02-22	CN106463624
EP3133657	A1	2017-02-22	EP3133657
US20170092433	A1	2017-03-30	US20170092433
JPWO2015159940	A1	2017-04-13	JP2015159940W
EP3133657	A4	2017-04-19	EP3133657
JP6249093	B2	2017-12-20	JP6249093



Abstract

(EP3133657)

Provided is a photoelectric conversion element including: a first electrode; a hole blocking layer; an electron transport layer;

a hole transport layer; and a second electrode, wherein the hole blocking layer includes a metal oxide including a titanium atom and a niobium atom.

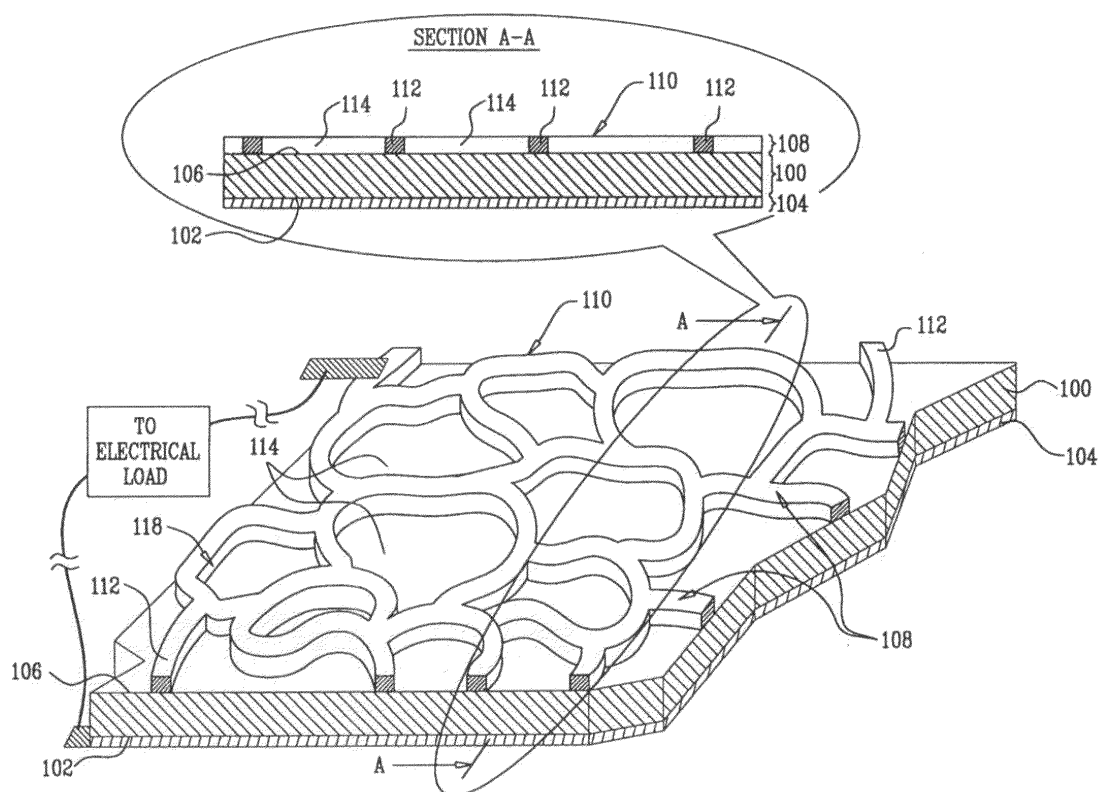
Family 24/28 - FAMPAT - ©Questel

Title

(EP2240286)

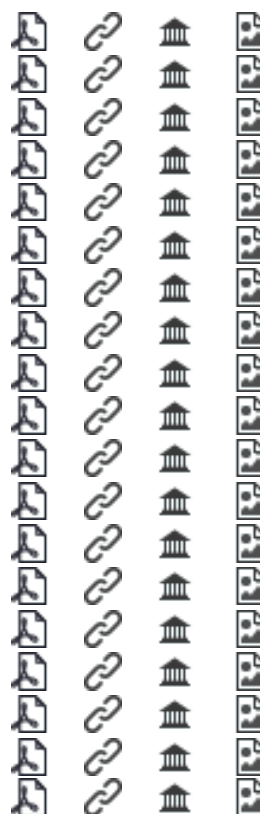
Transparent conductive coating with filler material

Images



Publication data including kind & date

WO2009086161	A1	2009-07-09	WO200986161
WO2009085224	A2	2009-07-09	WO200985224
TW200935452	A	2009-08-16	TW200935452
TW200939494	A	2009-09-16	TW200939494
WO2009085224	A3	2009-09-17	WO200985224
KR20100098448	A	2010-09-06	KR20100098448
EP2232571	A2	2010-09-29	EP2232571
EP2240286	A1	2010-10-20	EP2240286
KR20100114040	A	2010-10-22	KR20100114040
CN101945710	A	2011-01-12	CN101945710
CN101952973	A	2011-01-19	CN101952973
JP2011508424	A	2011-03-10	JP2011508424
JP2011515003	A	2011-05-12	JP2011515003
US20110175065	A1	2011-07-21	US20110175065
US20110273085	A1	2011-11-10	US20110273085
CN101952973	B	2012-09-26	CN101952973B
KR101234881	B1	2013-02-20	KR101234881
JP5302332	B2	2013-06-28	JP5302332
US8633474			



	B2	2014-01-21	US8633474				
CN101945710	B	2014-03-12	CN101945710B				
TWI438906	B	2014-05-21	TWI438906				
EP2240286	A4	2014-05-21	EP2240286				
US8795462	B2	2014-08-05	US8795462				
US20140306263	A1	2014-10-16	US20140306263				
TWI462119	B	2014-11-21	TWI462119				
JP2014225459	A	2014-12-04	JP2014225459				
KR20150103309	A	2015-09-09	KR20150103309				
KR101586506	B1	2016-01-18	KR101586506				
KR101586619	B1	2016-01-21	KR101586619				
KR20160010646	A	2016-01-27	KR20160010646				
JP5937300	B2	2016-05-20	JP5937300				

Abstract

(EP2240286)

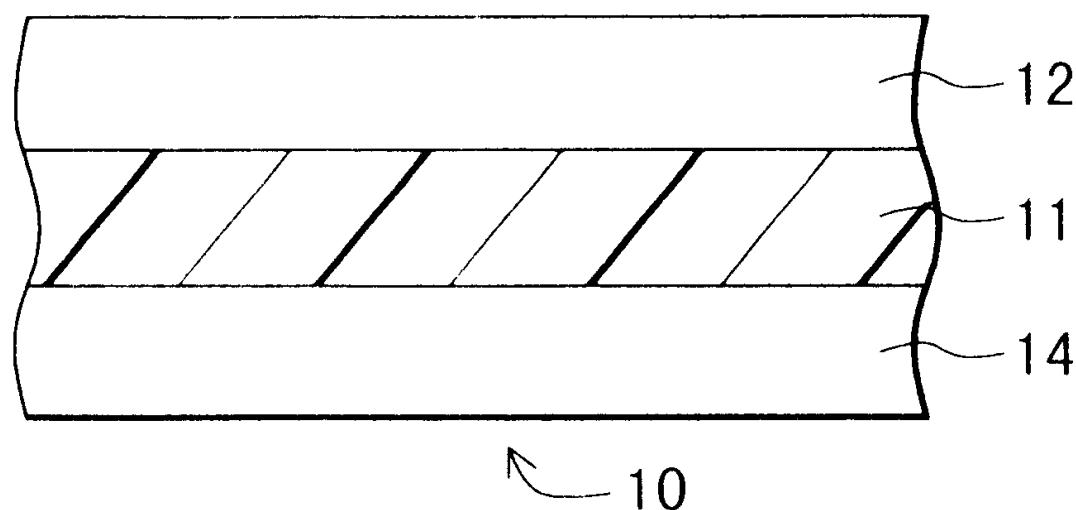
An article is disclosed comprising a network-like pattern of conductive traces formed of at least partially-joined nanoparticles that define randomly-shaped cells that are generally transparent to light and contain a transparent filler material. In one embodiment, the filler material is conductive such as a metal oxide or a conductive polymer. In another embodiment, the filler material is an adhesive that is can be used to transfer the network from one substrate to another. A method of forming the article is also disclosed wherein an emulsion containing the nanoparticles in the solvent phase and the filler material in the water phase is coated onto a substrate. The emulsion is dried and the nanoparticles self-assemble to form the traces and the filler material is deposited in the cells. An electroluminescent device is also disclosed wherein the article of the invention forms a transparent electrode in the device.

Family 25/28 - FAMPAT - ©Questel

Title

(US6661563)

Sheet-shaped display, sphere-like resin body, and micro-capsule

Images**Publication data including kind & date**

US20010046081	A1	2001-11-29	US20010046081				
JP2002162652	A	2002-06-07	JP2002162652				
US6661563	B2	2003-12-09	US6661563				

Abstract

(US6661563)

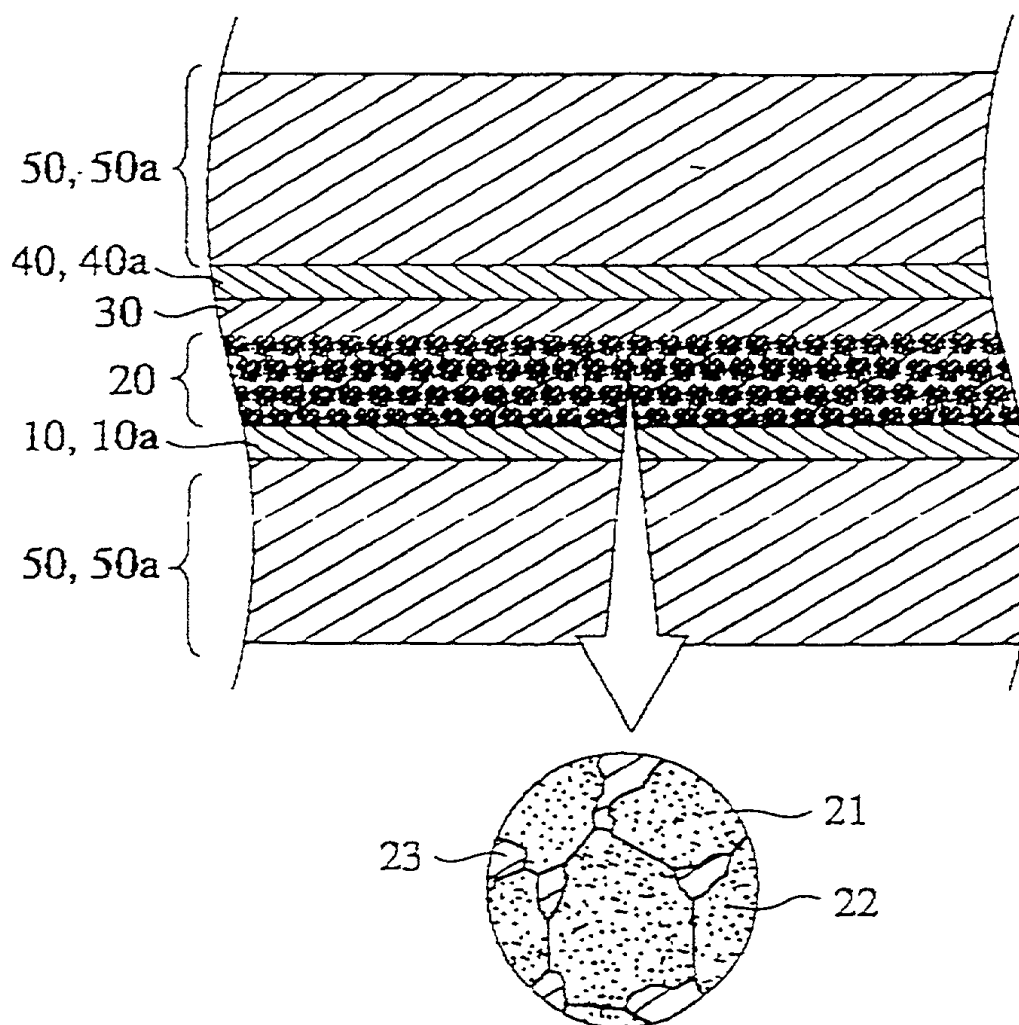
Provisions of a large screen, thin sheet-like display device capable of realizing usages just like paper, a sphere-like resin body made of two semispheres capable of being manufactured easily, and a microcapsule containing electrophoretic particles capable of being manufactured easily. The sheet-like display device 10 has a sheet-like display layer 12 and at least one layer 14 containing an element for activating the sheet-like display layer, the layers being integrally formed. The sphere-like resin body has first and second portions made of resins, the absolute value of a difference between both the solubility parameters δ_1 and δ_2 of the resins being $|\delta_1 - \delta_2| \geq 0.2$. The phoretic particle-containing microcapsule has a resin shell in which phoretic particles are contained in a core. The diameter of the core is in a range from 10 μm to 200 μm and the circumferential length L of the microcapsule is in a range of $(4.1 \times T) \leq L \leq (20.1 \times T)$ where T is a Martin diameter of the microcapsule.

Family 26/28 - FAMPAT - ©Questel

Title

(US20030205268)

Photoelectric conversion device and photo cell

Images**Publication data including kind & date**

JP2001357896	A	2001-12-26	JP2001357896
US20020015881	A1	2002-02-07	US20020015881
US20030205268	A1	2003-11-06	US20030205268
JP5081345	B2	2012-09-07	JP5081345

**Abstract**

(US20030205268)

A photoelectric conversion device comprising a particulate semiconductor layer, wherein the particulate semiconductor layer is prepared by a method comprising a step of irradiating semiconductor particles with electromagnetic wave or a step of heating semiconductor particles at a temperature of 50° C. or higher and lower than 350° C. under a pressure of 0.05 MPa or lower.

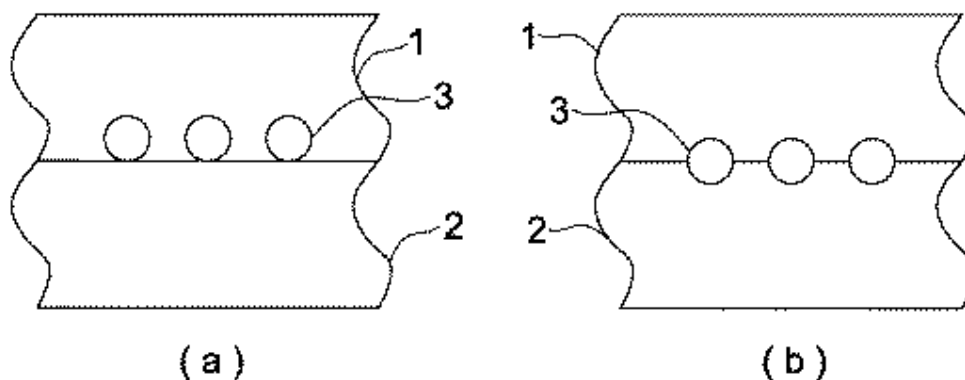
Family 27/28 - FAMPAT - ©Questel

Title

(JP2005085468)

Photoelectric conversion element

Images



Publication data including kind & date

[JP2005085468](#)

A 2005-03-31 JP2005085468



Abstract

(JP2005085468)

PROBLEM TO BE SOLVED: To provide a photoelectric conversion element with excellent durability without photoelectric conversion performance deteriorated.

SOLUTION: Of the photoelectric conversion element having a conductive layer, a semiconductor nano-particle layer sensitized by dyes, a charge transport layer and counter electrodes, a surface of the conductive layer has nano-size pores, with semiconductor nano-particles on the surface of the semiconductor nano-particle layer in insertion-coupling contact with the above pores.

COPYRIGHT: (C)2005,JPO&NCIPI

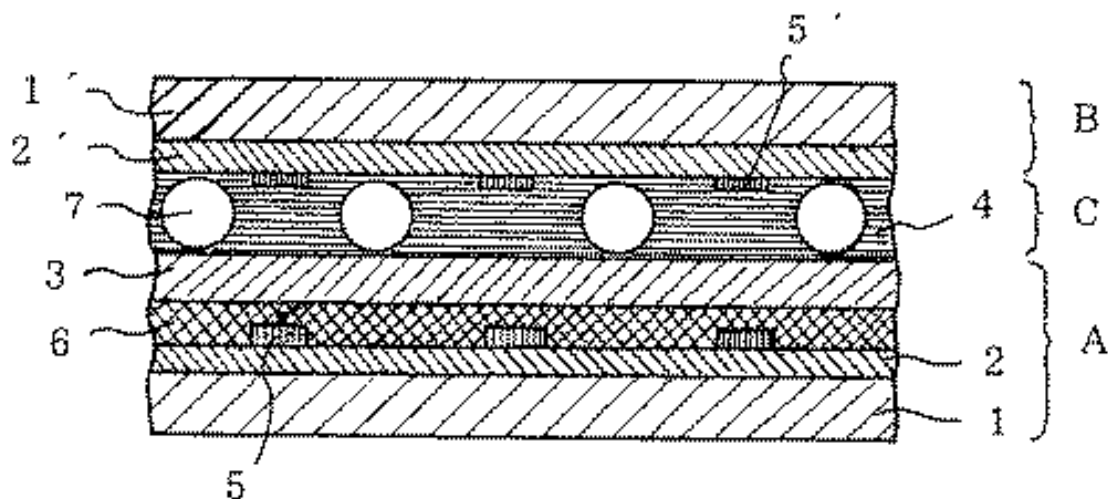
Family 28/28 - FAMPAT - ©Questel

Title

(JP2003257509)

Photovoltaic sheet as well as solar power generating unit and power generating device using it

Images



Publication data including kind & date

JP2003257509	A	2003-09-12	JP2003257509
JP4233260	B2	2008-12-19	JP4233260



Abstract

(JP4233260)

PROBLEM TO BE SOLVED: To provide a novel photovoltaic sheet and a novel solar power generating unit or a power generating device utilizing its physicality which maintain characteristics of a small environmental impact load and yet has physicality of well adapting itself to the requirement for feed bending.

SOLUTION: With the photovoltaic sheet consisting of an electrode A with porous semiconductor layers dye-sensitized through transparent conductive layers laminated on a transparent support sheet, an electrode B with transparent conductive layers on the transparent support sheet, and an electrolyte aqueous solution layer C inserted between and in contact with the porous semiconductor layer and the transparent conductive layer, transparent support bodies of the electrodes A, B are formed of a flexible material, on which, a lead wire is arranged to collect generated power in at least one of the transparent conductive layers and a mechanism of continuously supplying an electrolyte aqueous solution of water to the electrolyte aqueous solution layer C with the use of capillary action. With the use of this sheet, a solar power generating unit and a solar power generating device by coupling a plurality of them in series or in parallel.

COPYRIGHT: (C)2003,JPO

Search history

Search step	Result(s)	Query
8	15	((CZTS)/AB/ICLM/TI/TX AND (+GLYCOL+)/TI/AB/CLMS/DESC/ODES/ICLM/TX AND (MICROWAV+)/TI/AB/TX AND (CDS)/TI/AB/TX AND (THIN 5W (LAYER+ OR WRAP+ OR FILM+ OR SHEET+))/TI/AB/OBJ/ADB/ICLM)
7	15	(CZTS AND (TI OR TITANIUM) AND MICROWAVE+ AND GLYCOL)/TX/BI/SA/KEYW/IN/PA
6	779	(CZTS AND (TI OR TITANIUM) AND THIN)/TX/BI/SA/KEYW/IN/PA
5	9	CZTIS/TX/BI/SA/KEYW/IN/PA
4	28	3 AND PD<2017-11-21
3	32	((TITANIUM +OXIDE)/AB/ICLM/TI/TX AND (COPPER AND SULFID+ AND ZINC)/TI/AB/CLMS/DESC/ODES/ICLM/TX AND (MICROWAV+)/TI/AB/TX AND (CDS)/TI/AB/TX AND (SOLAR CELL+)/TI/AB/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (THIN 5W (LAYER+ OR WRAP+ OR FILM+ OR SHEET+))/TI/AB/OBJ/ADB/ICLM)
2	325	((TITANIUM +OXIDE)/AB/ICLM/TI/TX AND (COPPER AND SULFID+ AND ZINC)/TI/AB/CLMS/DESC/ODES/ICLM/TX AND (MICROWAV+)/TI/AB/TX AND (CDS)/TI/AB/TX AND (SOLAR CELL+)/TI/AB/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX)
1	91902	((TITANIUM +OXIDE)/AB/ICLM/TI/TX AND (COPPER AND SULFID+)/TI/AB/CLMS/DESC/ODES/ICLM/TX)

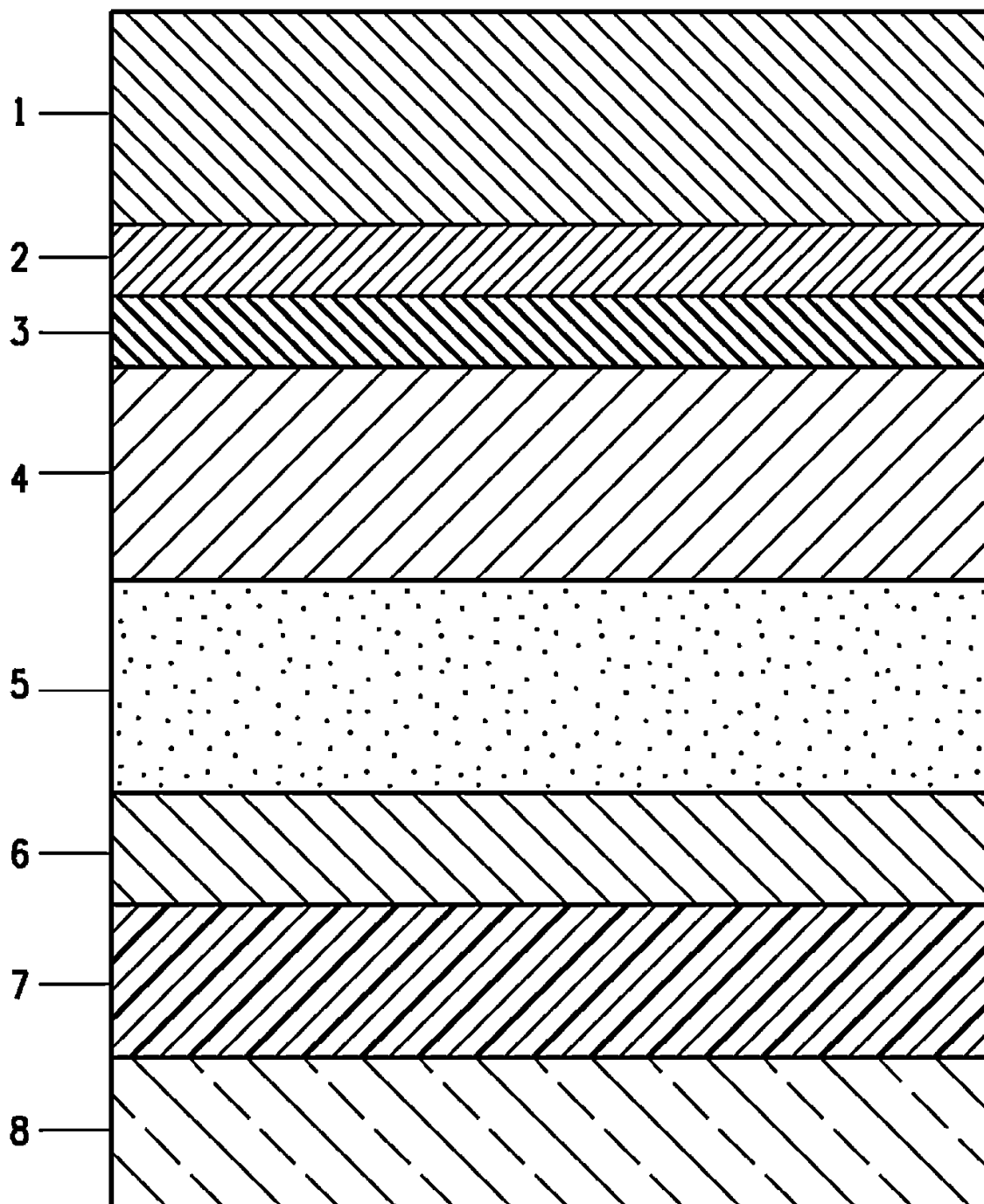
15 Documents

Publication numbers	Title	Current assignees
WO201165994 A2	CZTS /Se PRECURSOR INKS AND METHODS FOR PREPARING CZTS /Se THIN FILMS AND CZTS /Se-BASED PHOTOVOLTAIC CELLS	DU PONT DE NEMOURS
CN106601873 A	CZTS film applied spin coating apparatus and method for preparing CZTS battery	SUZHOU TALESON SOLAR TECHNOLOGIES
IN201741012657 A	A composition for preparing czts thin films and a process for preparing the composition	SRM UNIVERSITY
WO2010135667 A1	Copper zinc tin chalcogenide nanoparticles	DU PONT DE NEMOURS
WO2015113733 A1	Preparation of semiconductor films	MERCK
KR101584072 B1	Non-vacuum process method of thin film using carbon layer as diffusion barrier film	KOREA INSTITUTE OF ENERGY RESEARCH
KR101591719 B1	Non-vacuum process method of thin film using high pressure selenization process	KOREA INSTITUTE OF ENERGY RESEARCH
WO201200594 A1	Preparation of semiconductor films	MERCK
CN105161572 A	Ink multi-layer coating preparation method of Cu ₂ ZnSnS ₄ solar cell absorption layer	NANJING UNIVERSITY OF AERONAUTICS & ASTRONAUTICS (NUAA)
US20140326316 A1	Nanoscale precursors for synthesis of Fe ₂ (Si,Ge)(S,Se) ₄ crystalline particles and layers	DELAWARE STATE UNIVERSITY
WO201271287 A1	Inks and processes to make a chalcogen-containing semiconductor	DU PONT DE NEMOURS
WO201275267 A1	Inks and processes for preparing copper indium gallium sulfide/selenide coatings and films	DU PONT DE NEMOURS
WO201128957 A2	Methods and devices for processing a precursor layer in a group via environment	RAIL MATTHEW DIEGO
WO2009151665 A2	Methods and devices for processing a precursor layer in a group via environment	AERIS CAPITAL SUSTAINABLE IMPACT PRIVATE INVESTMENT FUND CAYMAN
US20130040420 A1	Methods and devices for processing a precursor layer in a group via environment	AERIS CAPITAL SUSTAINABLE IMPACT PRIVATE INVESTMENT FUND CAYMAN, ...

Family 1/15 - FAMPAT - ©Questel

Title

(EP2504854)

CZTS/Se PRECURSOR INKS AND METHODS FOR PREPARING **CZTS/Se** THIN FILMS AND **CZTS/Se**-BASED PHOTOVOLTAIC CELLS**Images****Publication data including kind & date**

WO2011065994	A2	2011-06-03	WO2011065994
WO2011065994	A3	2012-01-12	WO2011065994
KR20120085331	A	2012-07-31	KR20120085331
US20120220066	A1	2012-08-30	US20120220066
CN102668021	A	2012-09-12	CN102668021
EP2504854	A2	2012-10-03	EP2504854
JP2013512306	A	2013-04-11	JP2013512306



[US20130125988](#)

A1 2013-05-23

US20130125988

[US9105796](#)

B2 2015-08-11

US9105796

**Abstract**

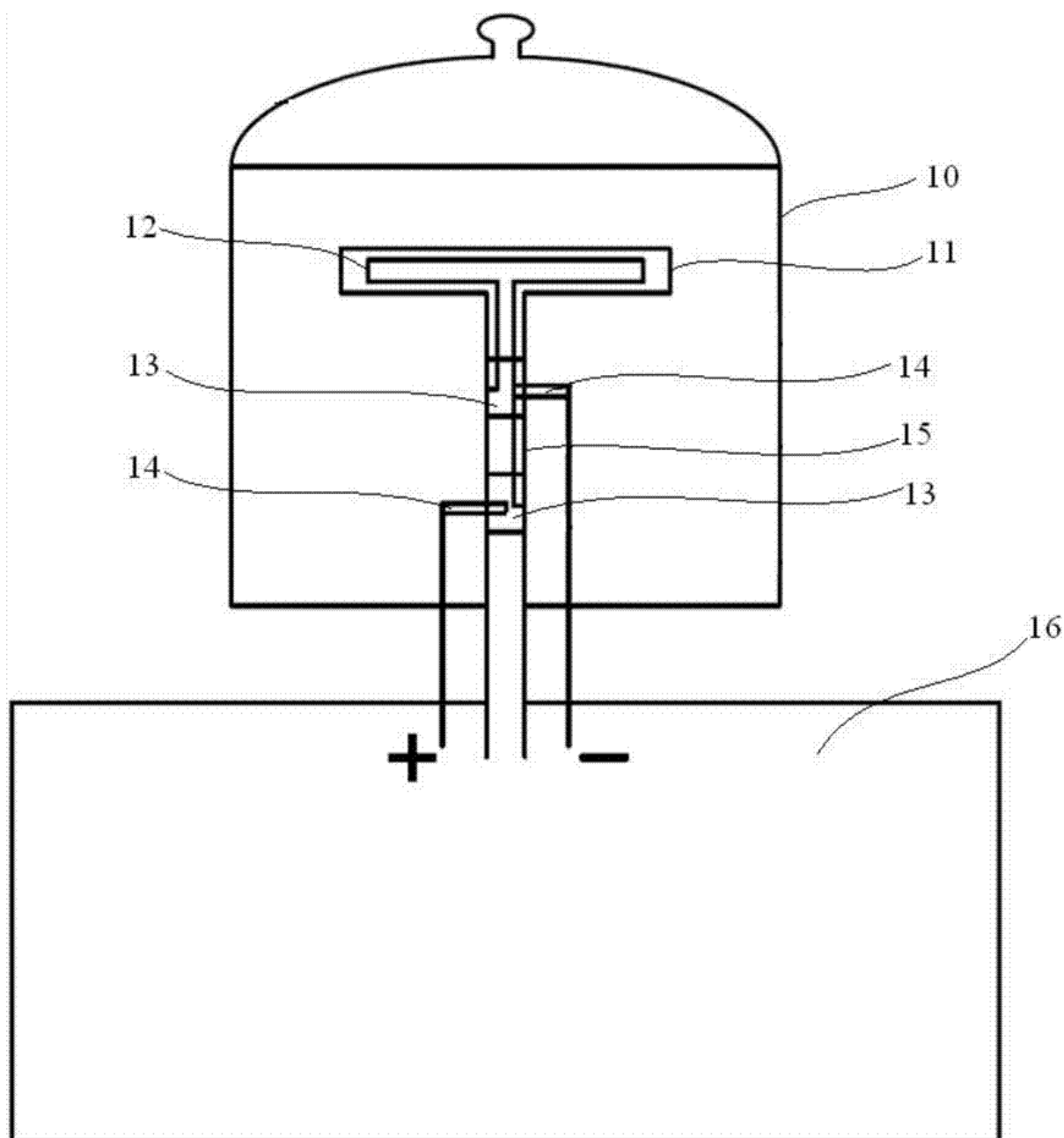
(EP2504854)

The present invention relates to coated binary and ternary nanoparticle chalcogenide compositions that can be used as copper zinc tin chalcogenide precursor inks. In addition, this invention provides processes for manufacturing copper zinc tin chalcogenide **thin films** and photovoltaic cells incorporating such **thin films**.

Family 2/15 - FAMPAT - ©Questel

Title

(CN106601873)

CZTS film applied spin coating apparatus and method for preparing **CZTS** battery**Images**1**Publication data including kind & date**[CN106601873](#)

A 2017-04-26

CN106601873



CN106601873

B 2018-06-29 CN106601873B

Abstract

(CN106601873B)

The invention discloses a **CZTS film** applied spin coating apparatus which can reduce the formation of micro-cracks on a **CZTS film**. The invention also discloses a **CZTS** battery method based on the spin coating apparatus so that the **CZTS film** of the prepared **CZTS** battery has fewer micro cracks and that the performance of the battery is improved. The **CZTS film** applied spin coating apparatus comprises a middle hollowed housing and a tray that is arranged inside the housing in a rotation manner to have the substrate absorbed and attached. The tray is internally embedded with a resistance wire whose two ends are fixedly connected with metal contact electrodes. The spin coating apparatus further comprises a power supply host machine and two metal fraction pieces in fixed connection with the anode and the cathode of the host machine respectively. The two metal fraction pieces are fixedly arranged inside the housing wherein one of the metal fraction pieces stays in contact with one of the metal contact electrodes and the other metal fraction piece stays in contact with the other metal contact electrode so that when the tray rotates, continuous power supply can be available to the resistance wire.

Family 3/15 - FAMPAT - ©Questel

Title

(IN201741012657)

A composition for preparing **czts thin films** and a process for preparing the composition**Publication data including kind & date**

IN201741012657

A 2018-10-12 IN201741012657

**Abstract**

(IN201741012657)

The present disclosure relates to a composition for preparing **thin films** and a process for preparing the composition. The composition comprises 2-methoxyethanol as a fluid medium, and thioacetamide as a sulfur source. The composition of the present disclosure is non-toxic, stable, and has a shelf life of about 20 months. High quality **CZTS thin films** can be prepared using the presently disclosed composition by single **layer** dip coating process at relatively low temperature. Solar cell devices fabricated using the **CZTS thin films** of the present disclosure have better open circuit voltage (Voc), short circuit current (Isc), and Efficiency (%).

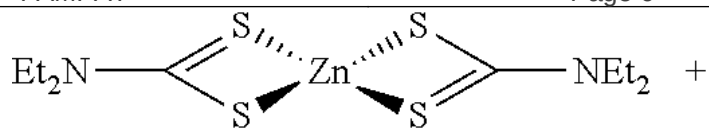
Family 4/15 - FAMPAT - ©Questel

Title

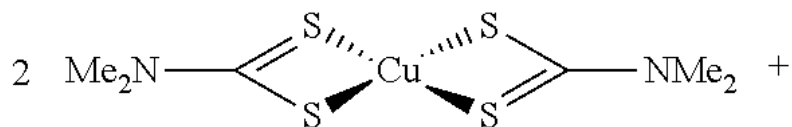
(EP2432842)

Copper zinc tin chalcogenide nanoparticles

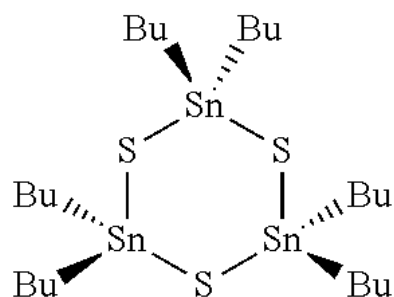
Images



Zinc Diethyldithiocarbamate



Copper(II) Dimethyldithiocarbamate



Di-n-butyltin sulfide

Publication data including kind & date

WO2010135667	A1	2010-11-25	WO2010135667
WO2010135665	A1	2010-11-25	WO2010135665
WO2010135622	A1	2010-11-25	WO2010135622
TW201107241	A	2011-03-01	TW201107241
US20120055554	A1	2012-03-08	US20120055554
US20120061628	A1	2012-03-15	US20120061628
US20120060928	A1	2012-03-15	US20120060928
KR20120028933	A	2012-03-23	KR20120028933
KR20120030434	A	2012-03-28	KR20120030434
EP2432842	A1	2012-03-28	EP2432842
EP2432841	A1	2012-03-28	EP2432841
EP2432840	A1	2012-03-28	EP2432840
KR20120036872	A	2012-04-18	KR20120036872
CN102439097	A	2012-05-02	CN102439097
CN102439098	A	2012-05-02	CN102439098
CN102439096	A	2012-05-02	CN102439096
JP2012527523	A	2012-11-08	JP2012527523
JP2012527402	A	2012-11-08	JP2012527402
JP2012527401	A	2012-11-08	JP2012527401
US9112094	B2	2015-08-18	US9112094



Abstract

(EP2432842)

This invention relates to nanoparticles of kesterite (copper zinc tin sulfide) and copper zinc tin selenide nanoparticles, inks

and devices thereof, and processes to prepare same. The nano-particles are useful to for the absorber **layer** as a p-type semiconductor in a **thin film** solar cell application.

Family 5/15 - FAMPAT - ©Questel

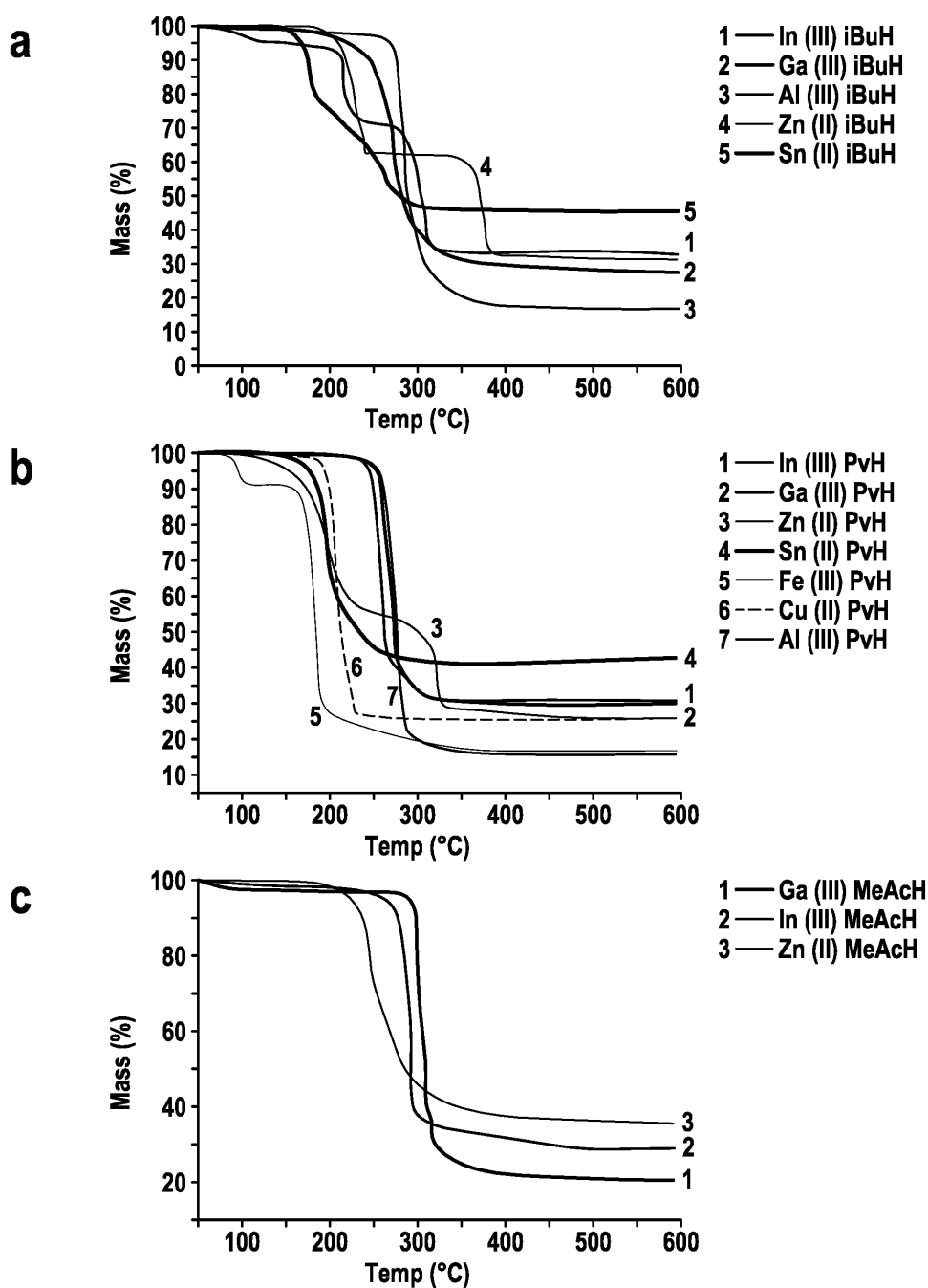
Title

(EP3100299)

Preparation of semiconductor **films**

Images

Fig. 1



Publication data including kind & date

WO2015113733	A1	2015-08-06	WO2015113733
TW201536935	A	2015-10-01	TW201536935
CN105940485	A	2016-09-14	CN105940485
KR20160115972	A	2016-10-06	KR20160115972



[EP3100299](#)

A1 2016-12-07 EP3100299

[US20160359060](#)

A1 2016-12-08 US20160359060

[JP2017512187](#)

A 2017-05-18 JP2017512187

**Abstract**

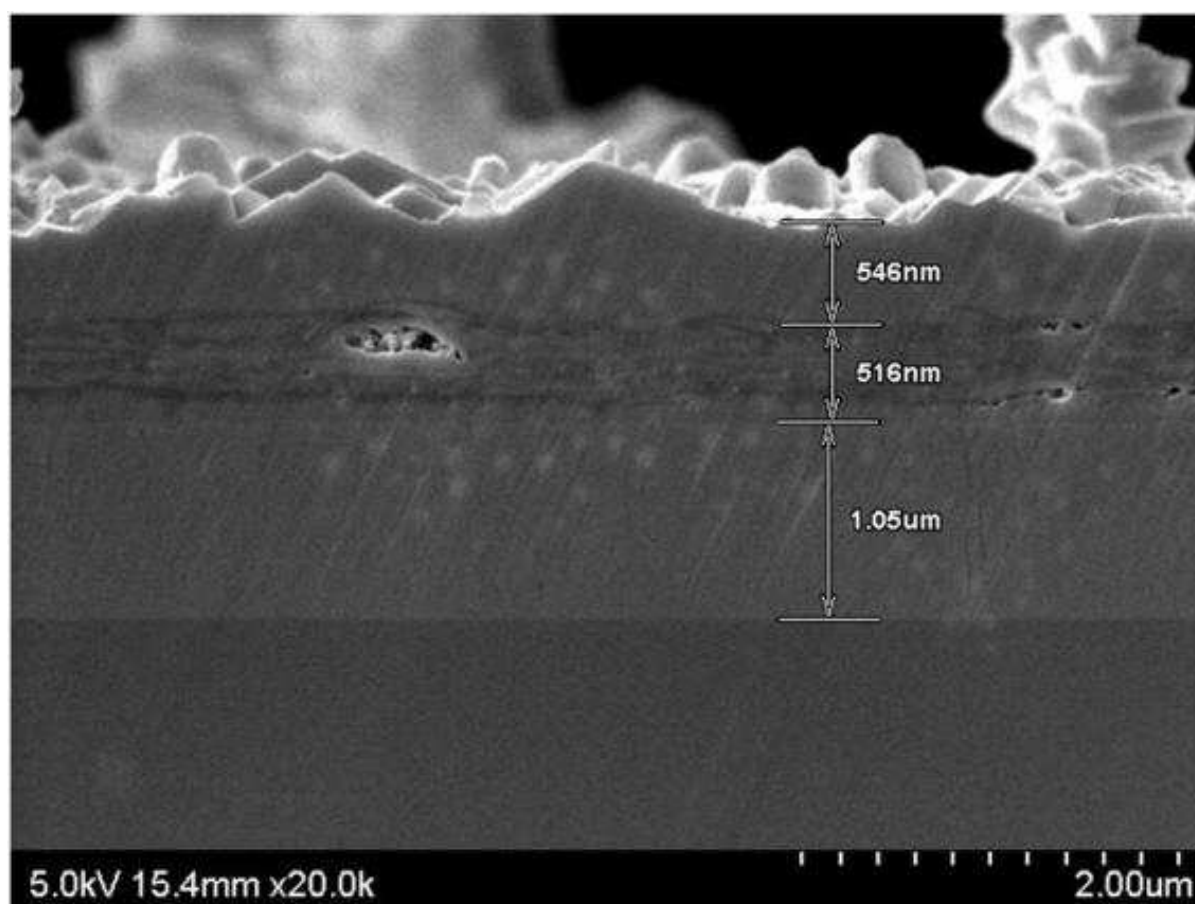
(EP3100299)

This invention relates to a precursor material, which can be decomposed to form semiconductors and metal oxides, or more generally, materials for electronic components. The precursors comprise metal complexes of hydroxamato ligands. The invention further relates to a preparation process for **thin inorganic films** comprising various metals (e.g. Cu/In/Zn/Ga/Sn) and oxygen, selenium and/or sulfur. The **thin films** can be used in photovoltaic panels (solar cells), other semiconductor or electronic devices, and other applications using such **films**. The process uses molecular, metal containing precursor complexes with hydroxamato ligands. These can be combined in the process with chalcogenide sources or oxygen. Exemplarily, various metal oxides and copper-based chalcopyrites of the I-III-VI₂ type are prepared with high purity at low temperatures.

Family 6/15 - FAMPAT - ©Questel

Title

(KR101584072)

Non-vacuum process method of **thin film** using carbon **layer** as diffusion barrier **film****Images****Publication data including kind & date**[KR101584072](#)

B1 2016-01-12 KR101584072

**Abstract**

(KR101584072)

The present invention relates to a non-vacuum **thin film** forming method using a carbon **layer** as a diffusion barrier **film** to manufacture a light absorbing **layer** of a solar cell and, more specifically, relates to a method of generating the carbon **layer** between a Cl(G)S base and a molybdenum (Mo) **layer** when a Cl(G)S based **thin film** is formed to form the Cl(G)S based **thin film** functioning as a role of a diffusion barrier **film** which prevents diffusion of several ions come up from a substrate;

and a solar cell using the same.

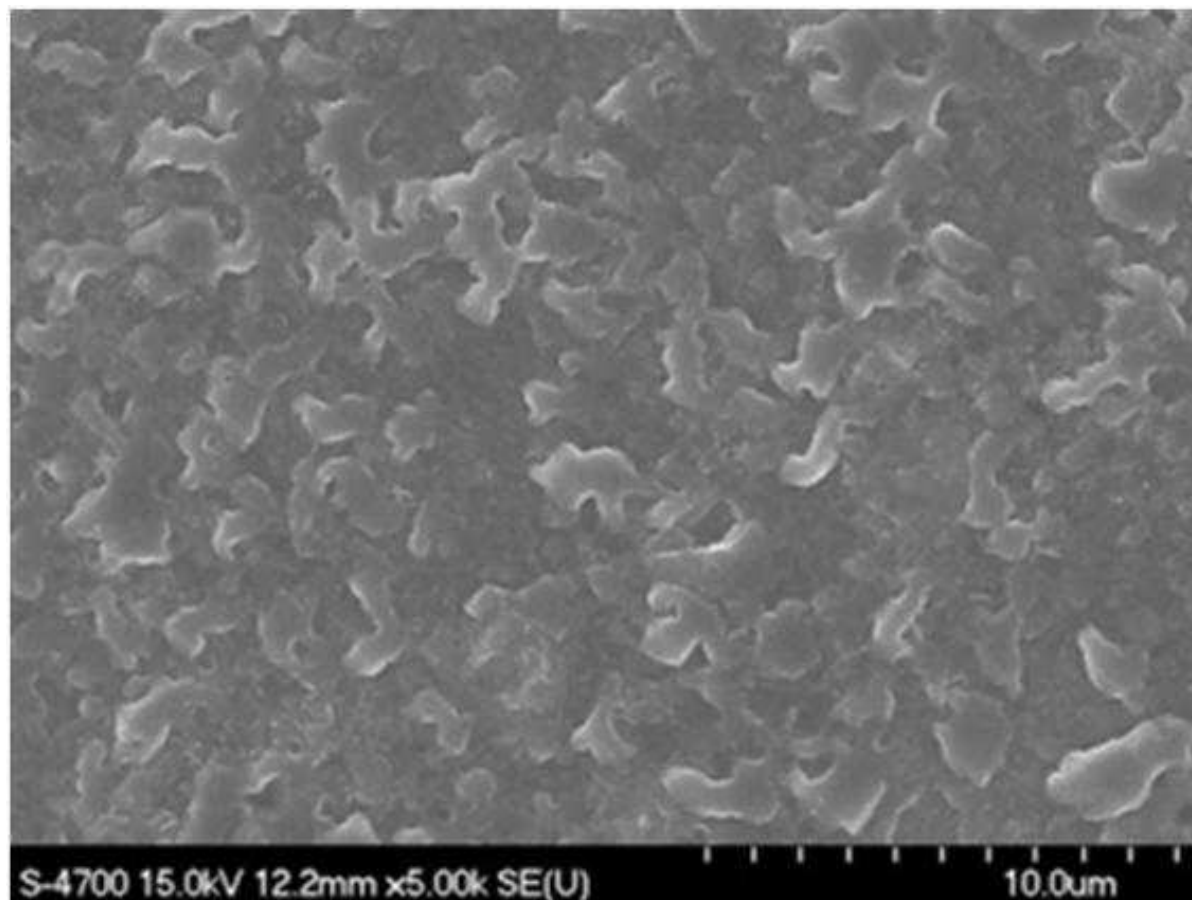
Family 7/15 - FAMPAT - ©Questel

Title

(KR101591719)

Non-vacuum process method of **thin film** using high pressure selenization process

Images



Publication data including kind & date

[KR101591719](#)

B1 2016-02-05 KR101591719



Abstract

(KR101591719)

The present invention relates to a non-vacuum processed manufacturing method of a **thin film** using a high-pressure selenization process for manufacturing a light absorbing **layer** of a solar cell, and to a method of forming a Cl(S)G-based **thin film** by a heat treatment in a selenium (Se) gas atmosphere maintaining a predetermined partial pressure and a solar cell applying the method of forming a Cl(S)G-based **thin film**.

Family 8/15 - FAMPAT - ©Questel

Title

(EP2589066)

Preparation of semiconductor **films**

Images

Fig. 1

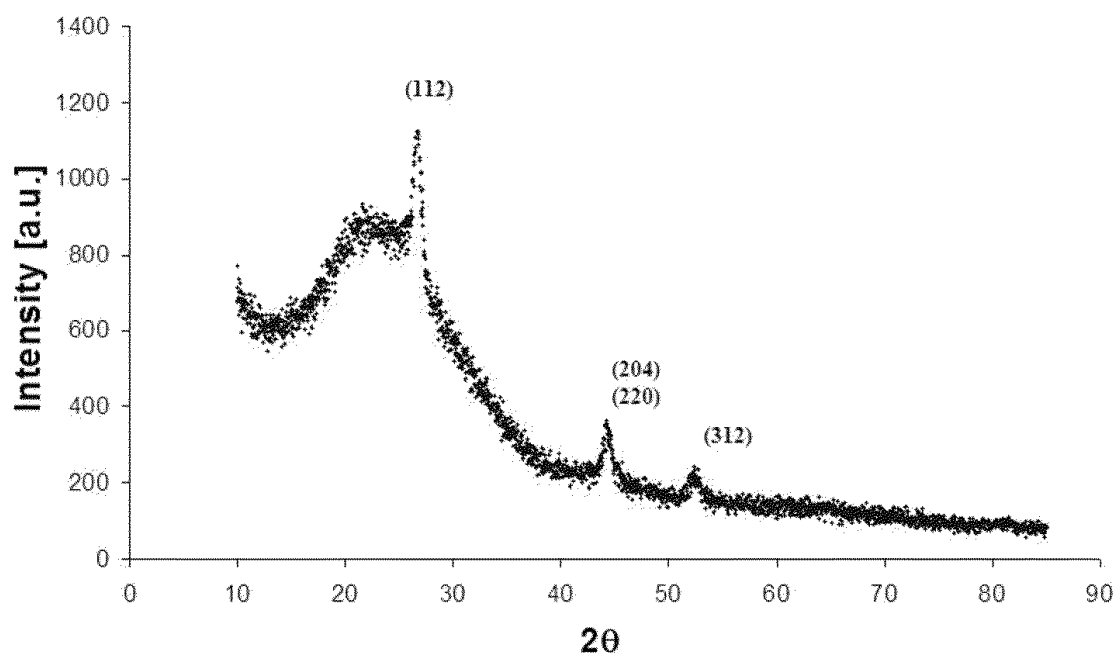
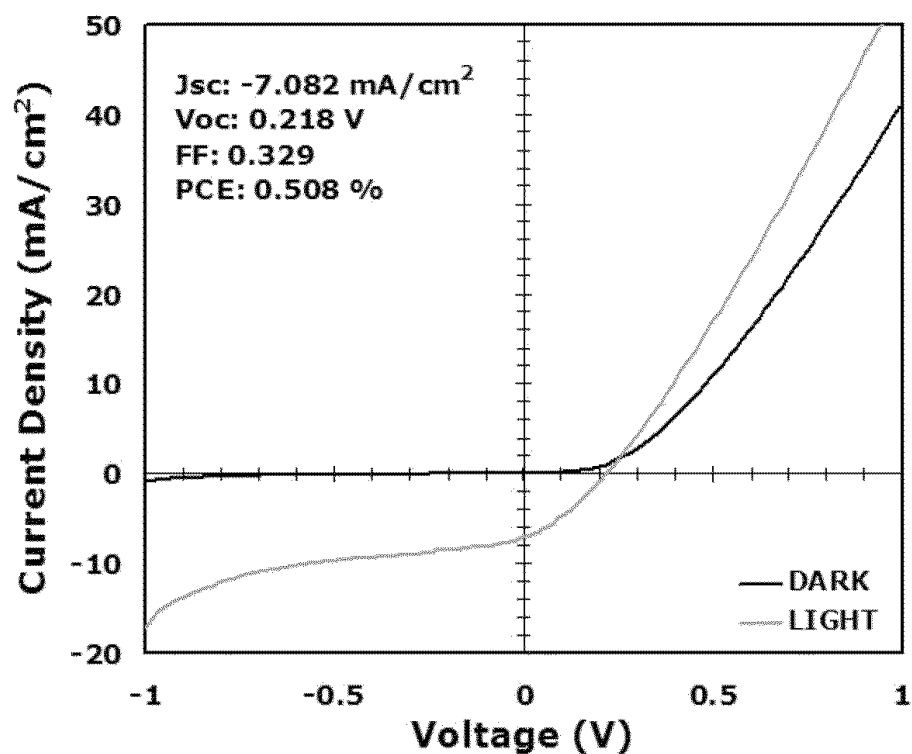


Fig. 2



Publication data including kind & date

WO2012000594	A1	2012-01-05	WO201200594
TW201210029	A	2012-03-01	TW201210029
CN102971832	A	2013-03-13	CN102971832
KR20130034662	A	2013-04-05	KR20130034662
US20130102108	A1	2013-04-25	US20130102108
EP2589066	A1	2013-05-08	EP2589066
JP2013530540	A	2013-07-25	JP2013530540
US9117964	B2	2015-08-25	US9117964



EP2589066

B1 2015-10-21 EP2589066

**Abstract**

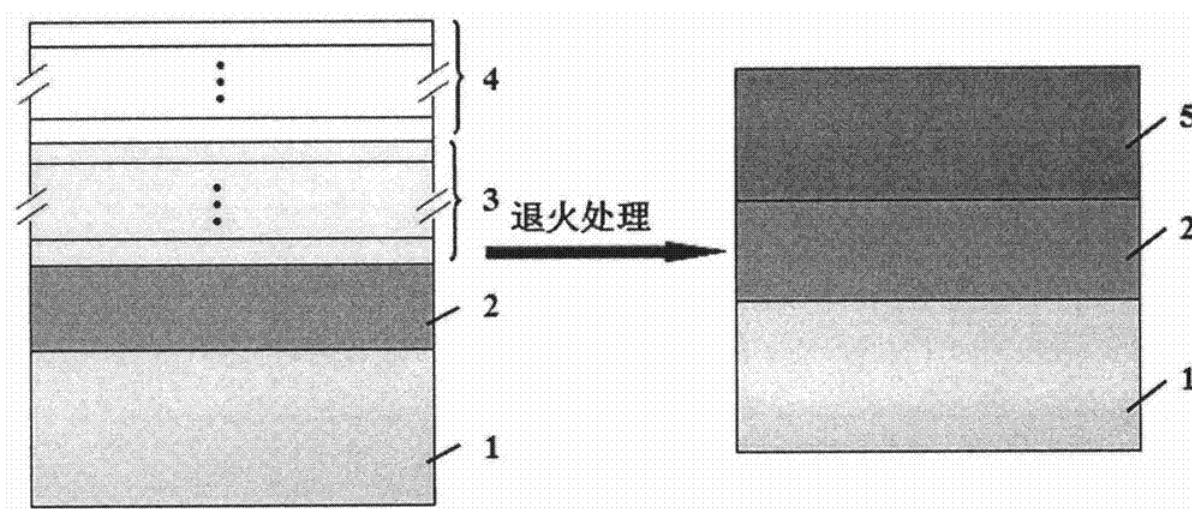
(EP2589066)

The invention relates to a preparation process for **thin** semiconducting inorganic **films** comprising various metals (Cu/In/Zn/Ga/Sn), selenium and/or sulfur. The process uses molecular precursors comprising metal complexes with oximate ligands. Copper-based chalcopyrites of the I-III- IV₂-type are prepared with high purity at low temperatures under ambient conditions. The **thin films** can be used in photovoltaic panels (solar cells).

Family 9/15 - FAMPAT - ©Questel

Title

(CN105161572)

Ink multi-**layer** coating preparation method of Cu₂ZnSnS₄ solar cell absorption **layer****Images****Publication data including kind & date**

CN105161572

A 2015-12-16 CN105161572



CN105161572

B 2017-11-14 CN105161572B

**Abstract**

(CN105161572B)

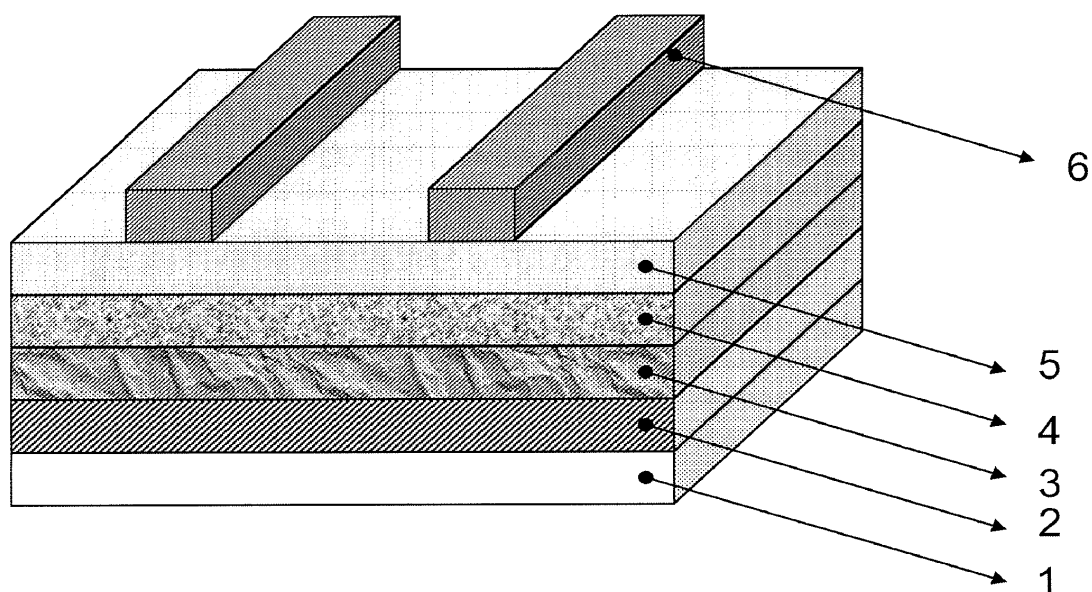
The invention relates to an ink multi-**layer** coating preparation method of a Cu₂ZnSnS₄ solar cell absorption **layer**. The method comprises the following steps: (a) preparing Cu₂ZnSnS₄ nano-particles and preparing Cu₂ZnSnS₄ nano-ink by a chemical solution method; (b) preparing a precursor molecular solution ink (a mixed solution containing Cu²⁺, Zn²⁺, Sn²⁺ and S²⁻) with good environmental compatibility; (c) coating a substrate with the Cu₂ZnSnS₄ nano-ink and the precursor molecular solution ink respectively by a spin-coating method or a spray coating method or a blade coating method, so as to prepare a Cu₂ZnSnS₄ prefabricated **thin film**; and (d) carrying out annealing in inert atmosphere or sulfur atmosphere or selenium atmosphere to prepare a high-quality Cu₂ZnSnS₄ **thin film**. Preparation of the Cu₂ZnSnS₄ **thin film** by a low-cost chemical method provided by the invention does not need expensive equipment or raw materials; the process stability is good; and the Cu₂ZnSnS₄ **thin film** with excellent photoelectric property can be prepared by controlling various processes. The high-quality Cu₂ZnSnS₄ photoelectric **film** is successfully prepared by the method which is low in cost and easy to produce on a large scale; and a foundation is laid for preparation of a low-cost and high-efficiency Cu₂ZnSnS₄ **thin film** solar cell.

Family 10/15 - FAMPAT - ©Questel

Title

(US9634161)

Nanoscale precursors for synthesis of Fe₂(Si,Ge)(S,Se)₄ crystalline particles and **layers****Images**

**Publication data including kind & date**

[US20140326316](#) A1 2014-11-06 US20140326316
[US9634161](#) B2 2017-04-25 US9634161

**Abstract**

(US9634161)

Thin films comprising crystalline Fe_2XY_4 , wherein X is Si or Ge and Y is S or Se, are obtained by coating an ink comprised of nanoparticle precursors of Fe_2XY_4 and/or a non-particulate amorphous substance comprised of Fe, X and Y on a substrate surface and annealing the coating. The coated substrate thereby obtained has utility as a solar absorber material in **thin film** photovoltaic devices.

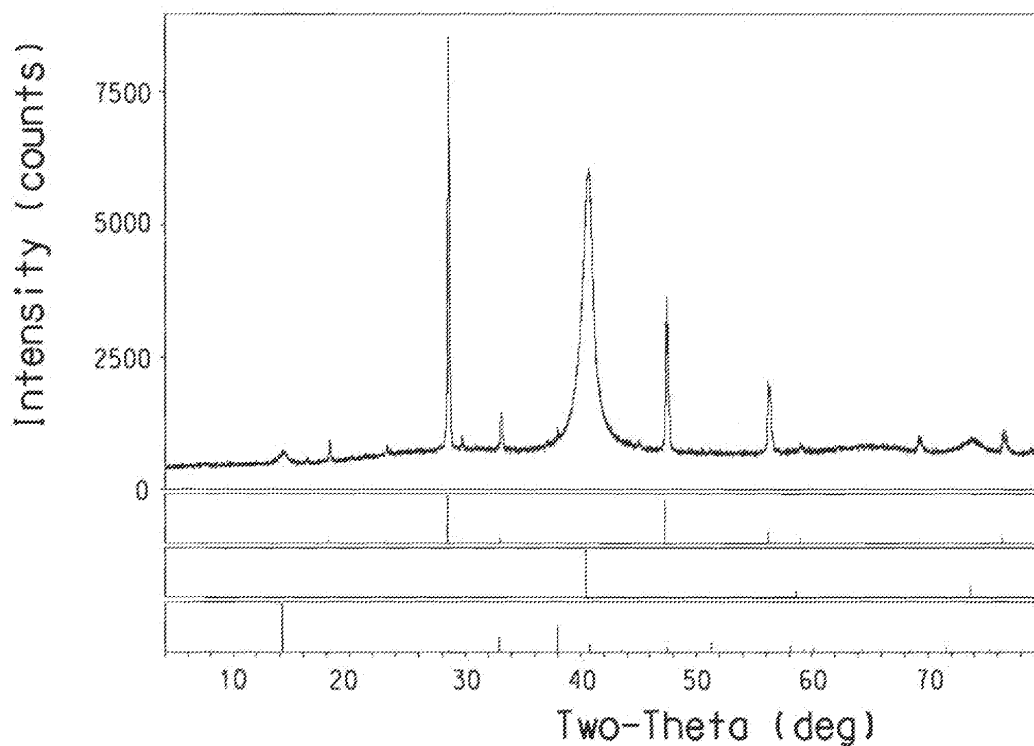
Family 11/15 - FAMPAT - ©Questel

Title

(WO201271287)

Inks and processes to make a chalcogen-containing semiconductor

Images



Publication data including kind & date

WO2012071287	A1	2012-05-31	WO201271287
CN103222062	A	2013-07-24	CN103222062
US20130221489	A1	2013-08-29	US20130221489
KR20130121129	A	2013-11-05	KR20130121129
JP2013544038	A	2013-12-09	JP2013544038



Abstract

(WO201271287)

An ink composition in admixture comprises a vehicle; a copper source selected from the group consisting of: elemental copper- containing particles, copper-containing chalcogenide particles, and 10 mixtures thereof; a zinc source selected from the group consisting of: elemental zinc-containing particles, zinc-containing chalcogenide particles, and mixtures thereof; and a tin source selected from the group consisting of: elemental tin-containing particles, tin-containing chalcogenide particles, and mixtures thereof; wherein at least one of the copper, zinc or tin sources comprises elemental copper-containing, elemental zinc-containing, or elemental tin-containing particles.

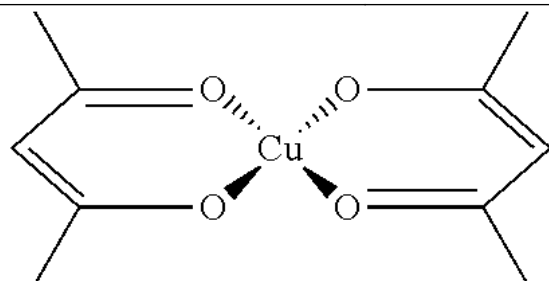
Family 12/15 - FAMPAT - ©Questel

Title

(WO201275267)

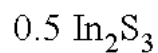
Inks and processes for preparing copper indium gallium sulfide/selenide coatings and **films**

Images



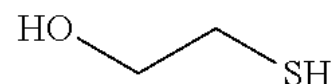
Copper(II) Acetylacetonate

+



+

Indium(III) Sulfide



2-Mercaptoethanol

Publication data including kind & date

WO2012075267	A1	2012-06-07	WO201275267
US20130233202	A1	2013-09-12	US20130233202
JP2014502052	A	2014-01-23	JP2014502052

**Abstract**

(WO201275267)

This invention relates to inks comprising molecular precursors to copper indium gallium sulfide/selenide (CIGS/Se) and a plurality of particles. The inks are useful for preparing coatings and **films** of CIGS/Se on substrates. Such **films** are useful in the preparation of photovoltaic devices. This invention also relates to processes for preparing coated substrates and **films** and also to processes for making photovoltaic devices.

Family 13/15 - FAMPAT - ©Questel

Title

(EP2474044)

Methods and devices for processing a precursor **layer** in a group via environment**Images**

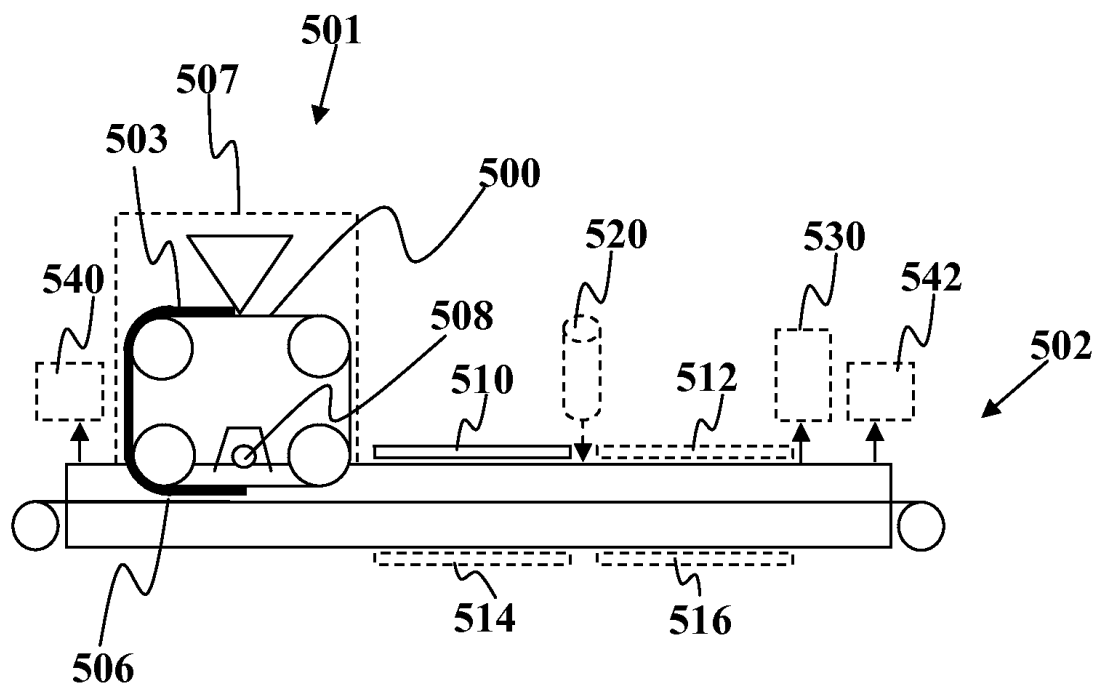


FIG. 5

Publication data including kind & date

WO2011028957	A2	2011-03-10	WO201128957
WO2011028957	A3	2011-07-14	WO201128957
EP2474044	A2	2012-07-11	EP2474044
JP2013504215	A	2013-02-04	JP2013504215
EP2474044	A4	2014-01-15	EP2474044



Abstract

(EP2474044)

Methods and devices for high-throughput printing of a precursor material for forming a **film** of a group IB-IIIa- chalcogenide compound are disclosed. In one embodiment, the method comprises forming a precursor **layer** on a substrate, the precursor is subsequently processed in a VIA environment.

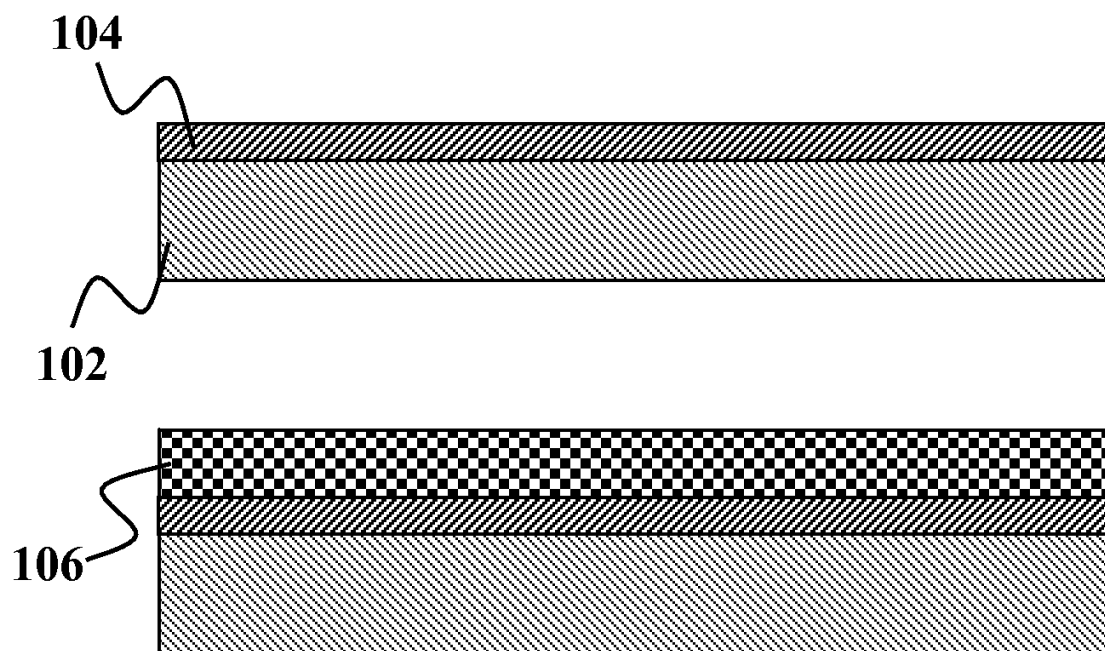
Family 14/15 - FAMPAT - ©Questel

Title

(EP2266145)

Methods and devices for processing a precursor **layer** in a group via environment

Images



Publication data including kind & date

WO2009151665	A2	2009-12-17	WO2009151665
US20100028533	A1	2010-02-04	US20100028533
WO2009151665	A3	2010-03-04	WO2009151665
EP2266145	A2	2010-12-29	EP2266145
US20110081487	A1	2011-04-07	US20110081487
US20110120373	A1	2011-05-26	US20110120373



Abstract

(EP2266145)

Methods and devices for high-throughput printing of a precursor material for forming a **film** of a group IB-IIIa- chalcogenide compound are disclosed. In one embodiment, the method comprises forming a precursor **layer** on a substrate, the precursor is subsequently processed in one or more steps in a VIA environment.

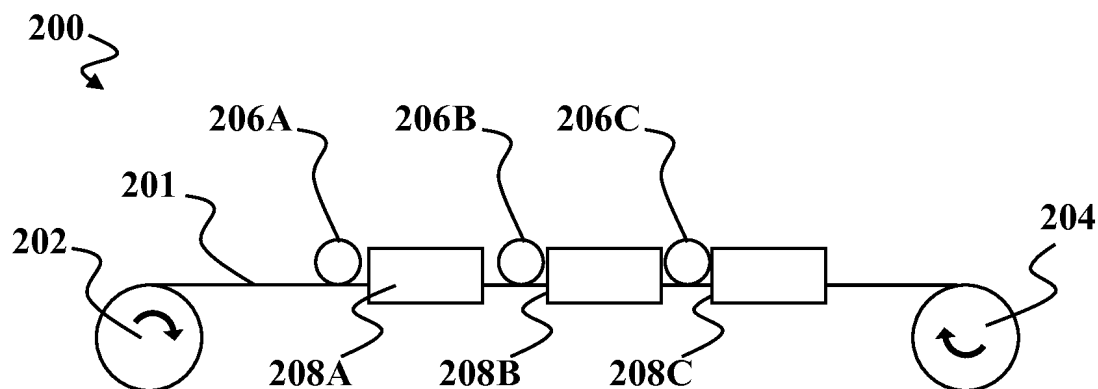
Family 15/15 - FAMPAT - ©Questel

Title

(US20130040420)

Methods and devices for processing a precursor **layer** in a group via environment

Images



Publication data including kind & date

[US20130040420](#)

A1 2013-02-14 US20130040420

**Abstract**

(US20130040420)

A precursor **layer** for a photovoltaic absorber **layer** on a substrate is formed, where the precursor **layer** comprises group IB and IIIA elements. The precursor **layer** is heated in an elongate furnace, where the heating includes depositing a group VIA-based material on the precursor **layer**. The substrate is placed on a support and advanced through the furnace. The support has an anti-stiction surface of a material including at least one of: silicon carbide, glass, spin-on-glass (SOG), diamond-like carbon (DLC), silicon carbide (SiC), a hydrogenated diamond coating, pyrolytic carbon and a fluoropolymer.