SELECT distinct tls201_appln.appln_id, appln_auth, appln_nr, appln_filing_date, earliest_filing_year, granted, nb_citing_docdb_fam, nb_applicants, nb_inventors, ipc_class_symbol, cpc_class_symbol, publn_auth, publn_nr FROM tls201_appln JOIN tls209_appln_ipc ipc1 ON tls201_appln.appln_id = ipc1.appln_id JOIN tls224_appln_cpc cpc2 ON tls201_appln.appln_id = cpc2.appln_id JOIN tls202_appln_title on tls201_appln.appln_id = tls202_appln_title.appln_id JOIN tls203_appln_abstr on tls201_appln.appln_id = tls203_appln_abstr.appln_id JOIN tls207_pers_appln ON tls201_appln.appln_id = tls207_pers_appln.appln_id JOIN tls206_person ON tls207_pers_appln.person_id = tls206_person.person_id JOIN tls211_pat_publn ON tls201_appln.appln_id = tls211_pat_publn.appln_id where /*(left (cpc2.cpc_class_symbol,8) in ('B03B', 'B02C 13', 'B30B 9', 'B09B 3', 'B32B') OR left (ipc1.ipc_class_symbol,8) in ('B03B', 'B02C 13', 'B30B 9', 'B09B 3', 'B32B')) AND*/ (appln_abstract LIKE '%glass%' OR appln_abstract LIKE '% laminated glass%' OR appln_abstract like '%laminate glass%' OR appln_abstract like '%laminated glass%' OR appln_abstract like '%tempered glass%' OR appln_abstract LIKE '%safety-glass % OR appln_abstract like '%laminate-glass%' OR appln_abstract like '%tempered-glass%' OR appln_abstract like '%vetro stratificato % OR appln_abstract like '%vetro laminato%' OR appln_abstract like '%vetro temperato% OR appln_abstract like '%verre feuilllete%' OR appln_abstract like '%vidrio laminado%' OR appln_abstract like '%vidrio temperado% OR appln_abstract like '%verbundglass%' OR appln_title LIKE '%glass%' OR appln_title LIKE '% laminated glass%' OR appln_title like '%laminate glass%' OR appln_title like '%laminated glass%' OR appln_title like '%tempered glass%' OR appln_title LIKE '%safety-glass % OR appln_title like '%laminate-glass%' OR appln_title like '%tempered-glass%' OR appln_title like '%vetro stratificato % OR appln_title like '%vetro laminato%' OR appln_title like '%vetro temperato% OR appln_title like '%verre feuilllete%' OR appln_title like '%vidrio laminado%' OR appln_title like '%vidrio temperado% OR appln_title like '%verbundglass%') AND earliest_filing_year between 1997 and 2017 INTERSECT SELECT distinct tls201_appln.appln_id, appln_auth, appln_nr, appln_filing_date, earliest_filing_year, granted, nb_citing_docdb_fam, nb_applicants, nb_inventors, ipc_class_symbol, cpc_class_symbol, publn_auth, publn_nr FROM tls201_appln JOIN tls209_appln_ipc ipc1 ON tls201_appln.appln_id = ipc1.appln_id JOIN tls224_appln_cpc cpc2 ON tls201_appln.appln_id = cpc2.appln_id JOIN tls202_appln_title on tls201_appln.appln_id = tls202_appln_title.appln_id JOIN tls203_appln_abstr on tls201_appln.appln_id = tls203_appln_abstr.appln_id JOIN tls207_pers_appln ON tls201_appln.appln_id = tls207_pers_appln.appln_id JOIN tls206_person ON tls207_pers_appln.person_id = tls206_person.person_id JOIN tls211_pat_publn ON tls201_appln.appln_id = tls211_pat_publn.appln_id where (left (cpc2.cpc_class_symbol,8) IN ('B29B 17', 'Y02W 30', 'B32B') OR left (ipc1.ipc_class_symbol,8) IN ('B29B 17', 'Y02W 30', 'B32B')) AND (appln_title LIKE ('ethylene vinyl acetate') OR appln_title LIKE ('% EVA %') OR appln_title LIKE ('%ÉthylèneVinylacetat%') OR appln_title LIKE ('%Etilvinilacetato%') OR appln_title LIKE ('%Éthylène%vinyle%') OR appln_title LIKE ('%Étiennevinilaçetat%') OR appln_abstract LIKE ('ethylene vinyl acetate') OR appln_abstract LIKE ('% EVA %') OR appln_abstract LIKE ('%ÉthylèneVinylacetat%') OR appln_abstract LIKE ('%Etilvinilacetato%') OR appln_abstract LIKE ('%Éthylène%vinyle%') OR appln_abstract LIKE ('%Étiennevinilaçetat%') OR appln_abstract LIKE ('%acetato%vinilo%etileno%') OR appln_title LIKE ('%Этиленвинилацетат%') OR appln_title LIKE ('%Этиленвинилацетат%') OR appln_title LIKE ('%Этиленвинилацетат%') OR appln_title LIKE ('%Этиленвинилацетат%') OR appln_title LIKE ('%Этиленвинилацетат%') OR appln_title LIKE ('%Этиленвинилацетат%') OR appln_title LIKE ('%Этиленвинилацетат%') OR appln_title LIKE ('%Этиленвинилацетат%') OR appln_title LIKE ('%Этиленвинилацетат%') OR appln_title LIKE ('%Этиленв
20 documents
PROBLEM TO BE SOLVED: To provide a method of recovering silicon wafers and tempered glass from discarded solar battery modules and defective products produced in the course of production thereof and for recycling them. SOLUTION: The discarded solar battery modules are immersed in nitric acid, which contains a surfactant and is kept at a liquid temperature of 50°C or above, to decompose and remove EVA (ethylene-vinyl acetate) and to separate and recover silicon wafers and tempered glass with a high efficiency. The recovered tempered glass is cleaned with an alkaline solution for recycling. The recovered silicon wafer is cleaned with an organic solvent to provide a reclaimed silicon wafer having a clean surface. Prior to the cleaning with the organic solvent, the silicon wafer may be washed with nitric acid. The recovered or reclaimed silicon wafer is immersed in a mixed solution, composed of hydrofluoric acid, nitric acid, and acetic acid and/or sulfuric acid, or phosphoric acid to provide a reclaimed high-purity silicon wafer. Defective products produced during the production of silicon wafers can be reclaimed in the same method to provide silicon wafers having a clean surface or high-purity silicon wafers. COPYRIGHT: (C)2004 JPO
Title (en)
Manufacturing Methods of Concrete Interlocking Block and Permeable Concrete Interlocking Block for Roadway and Sidewalk Using Crushed Aggregates from Waste Glasses and Blast Furnace Cement.

Application
KR 20010001047 A 20010108

Publication
KR 100334140 B1 20020425
KR 20010074041 A 20010804

Abstract (en)
PURPOSE: A method for manufacturing concrete interlocking block for foot/drive ways is provided to impart favorable surface roughness and melting-away of snow onto the block by comprising SBR or EVA latex and Mesh type chopped fiber. CONSTITUTION: The method comprises mixing 10-50 wt.% of waste glass aggregate having particle size of 4.75-2.5mm and maximum size of 4.75mm or having particle size of 10-4.75mm and maximum size of 10mm, and 30-50 wt.% of blast furnace slag powder; adding 5-10 wt.% of SBR (Styrene-Butadiene Rubber) or EVA (Ethylene vinyl acetate) latex as a polymer dispersing agent and the balance of Mesh type polypropylene chopped fiber having 20-40mm length or Alkali resistance glass fiber having 15-40mm as the reinforcing fiber.

IPC
C04B 18/04 (2006.01)
The Manufacturing Method of Constructional Materials Effecting Both Adiabatic and Impact Sound Insulation Through Floor in Apartment Houses

PURPOSE: Provided are a building material for interlayer sound and heat insulations of public housing useful for forming a sound insulating material, which predominantly comprises clay minerals and rice hulls, and has an ecofriendly, adiabatic effect, and a method for producing the same.

CONSTITUTION: The building material is characterized by comprising rice hulls, clay minerals, water glass, ethylene vinyl acetate(EVA) with weight ratio of 10-30:20-60:5-20:5-20, and further comprising water. The building material is produced by the method comprising the steps of (i) washing the rice hulls with water not to be decayed, and finely crushing the rice hulls; (ii) blending the crushed rice hulls, clay minerals, water glass, and EVA in weight ratio of 10-30:20-60:5-20:5-20, and further mixing the materials by adding appropriate ratio of water; (iii) charging the mixture into predetermined mold and pressing the mixture at ambient temperature, so as to mold the mixture.

IPC
C04B 18/24 (2006.01)
PURPOSE: Organic/inorganic composite mortar using waste glass powder, and a floor construction method using thereof are provided to improve the abrasion resistance of a floor material by mixing artificial silica with the waste glass powder. CONSTITUTION: Organic/inorganic composite mortar using waste glass powder contains 100 parts of floor mortar by weight and 15~25 parts of water-soluble EVA polymer by weight. The floor mortar contains 20~40wt% of alumina cement, 5~20wt% of gypsum, 5~20wt% of white cement, 20~40wt% of artificial silica, 0.1~1wt% of cellulosic fiber, 10~20wt% of waste glass powder, 0.1~0.5wt% of MC, 0.5~1wt% of super-plasticizer, 0.3~1wt% of antifoaming agent, 0.1~1wt% of promoter, and 0.1~1wt% of retarder.
PURPOSE: A cell recovering method of a solar battery waste module is provided to recycle a solar battery cell as a pure silicon wafer, and to economically reduce silicon. CONSTITUTION: A cell recovering method of a solar battery waste module comprises the following: cutting the solar battery waste module with damaged pyrex glass(14) into a constant size, and dipping into an organic solvent; separating the pyrex glass from EVA(12) and cells(11); and heat-processing the EVA and cells, for dissolving the EVA and collecting the cells.
PROBLEM TO BE SOLVED: To provide a method for dismantling a solar battery module into parts rapidly, simply and easily, and recovering, from the parts, respective materials including a silicon cell, glass and EVA in reusable forms.

SOLUTION: A solar battery module is immersed in an aromatic organic solvent selected from a group consisting of toluene, benzene and xylene and a mixture thereof, which has been previously heated to 15-40°C. Then, application of ultrasonic waves to the battery module is started to separate the silicon cell, EVA layer and glass from one another.
PURPOSE: A method for collecting silicon from solar cell module waste is provided to collect pure silicon and recycle the collected silicon as a silicon wafer by collecting cells from the solar cell module waste and eliminating a non-reflective coating layer and electrode materials from the cells.

CONSTITUTION: Solar cell module waste is immersed in an organic solvent in order to collect cells(11) based on the swelling phenomenon of ethylene vinyl acetate(EVA)(12). Trichloroethylene, o-dichlorobenzene, or toluene is used as the organic solvent. Reinforced glass(14), separated from the cells based on the swelling phenomenon of the EVA, is collected. Cells attached to the EVA are passed through a furnace of 500-700 degrees Celsius under an inert atmosphere condition in order to pyrolyze the EVA. The cells are collected. A mixed acid solvent is obtained by mixing distilled water, nitric acid, fluoric acid, sulfuric acid, and acetic acid. A mixed solvent is obtained by additionally mixing surfactant to the mixed acid solvent. The collected cells are immersed in the mixed solvent to dissolve a non-reflective coating layer and electrode materials. Pure silicon is collected.

IPC
B09B 3/00 (2006.01)
B09B 5/00 (2006.01)
C01B 33/021 (2006.01)
PURPOSE: A silicon collecting method from a used solar cell module is provided to increase productivity and to reduce costs required for producing solar cells by collecting and recycling expensive silicon. CONSTITUTION: A used solar cell module is immersed in organic solvent in order to collect solar cells based on the swelling phenomenon caused by ethylene vinyl acetate (EVA). Tempered glass separated from the solar cells is pre-collected. The solar cells attached to the swollen EVA undergo a pyrolyzing operation in the furnace at 500 to 700 degrees Celsius under an inert atmosphere, and the EVA is eliminated. Mixed acid solvent is prepared by mixing distilled water, nitric acid, fluoric acid, sulfuric acid, and acetic acid in order to eliminate an anti-reflective coating film and electrode materials from the cells. 5 to 25% of surfactant based on the total volume of the mixed acid solvent is added to the mixed acid solvent to obtain mixed solvent. The collected cells are immersed in the mixed solvent for 15 to 25 minutes to collect pure silicon.
Purpose: An environmentally-friendly dismantlement method of a waste solar cell module is provided to process the waste solar cell module by organically combining a jig to guide the injection of the waste solar cell module with a thermal wind blowing method. Constitution: A frame and a junction box are separated from a waste solar cell module (S10). A back sheet and an EVA are pyrolyzed by heating the waste solar cell module after the waste solar cell module without the frame and the junction box is injected into a chamber (S20). The pyrolyzed result is completely removed by burning and vaporizing the pyrolyzed result of the back sheet and the EVA (S40). The waste solar cell module is separated and collected (S50).

[Reference numerals] (AA) Start; (BB) Finish; (S10) Mechanical separation; (S20) First thermal process; (S30) Heating temperature >=350°C; (S40) Second burning; (S45) Collect burnt materials; (S50) Collect a solar cell and a reinforced glass; (S53) Inject an inert gas

IPC
H01L 31/042 (2014.01)
The invention discloses a recycling method of a CdTe solar cell module. The recycling method is characterized in that the CdTe solar cell glass module of which EVA encapsulation adhesive is removed is dipped in a sulfuric acid/hydrogen peroxide solution to be subjected to adequate acid etching, Cd and Te elements are directly and quickly gathered from an acid etching solution of CdTe by using magnetic polymer microspheres, and obtained high-concentration Cd and Te acid etching solution can be further used for an electrolytic process. The recycling process has the characteristics of high gathering separation efficiency, simple technical process and easy amplification, and the magnetic polymer microspheres can be recycled.
PROBLEM TO BE SOLVED: To provide a method of recovering, safely and efficiently without occurrence of waste liquid, a constituent material of a solar cell element, including cell constituting materials, e.g. silicon substrates in solar cell modules and glass substrate discarded so far.

SOLUTION: A method of recovering constituent materials of a solar cell element contained in a solar cell module includes a step of carrying a solar cell element including at least a cell part, a glass substrate and an ethylene vinyl acetate (EVA) sealing material to a continuous type heat treatment furnace retaining an oxygen concentration in the furnace of 1.0-3.0 vol.%, removing and discharging acetic acid gas, an EVA decomposition gas, in a preliminary heating decomposition part set at 300-400°C, removing the EVA sealing material from the solar cell element by eliminating decomposition gas of EVA other than acetic acid in a thermal treatment part set at 400-550°C and separating the cell part from the glass substrate.
The invention provides an EVA heat treatment technology of a waste crystalline silicon solar cell module, and can realize the effective separation of toughened glass, crystalline silicon cell pieces and a back plate of a waste crystalline silicon solar panel. The whole process has simple operation, no EVA residue in the heat treatment process, and the generated waste gas enters into an incinerator for incineration to avoid secondary pollution. The invention adopts the heat treatment process to effectively avoid environmental pollution caused by organic solvent volatilization in the process of EVA dissolution by an organic solvent, and also greatly shortens the processing cycle.
The invention belongs to the technical field of building materials, and particularly relates to flame-retardant thermal insulation mortar doped with cob cores and a preparation method thereof. The flame-retardant thermal insulation mortar doped with the cob cores is prepared from ordinary portland cement, superfine slag powder, desulphurization gypsum, calcium hydroxide, glass beads, the cob cores, EVA (ethylene-vinyl acetate) emulsion powder, an air entraining agent and hydroxypropyl starch ether and the like, wherein the cob cores serve as main lightweight aggregates.

The flame-retardant thermal insulation mortar is prepared by fully utilizing the agricultural waste cob cores and other solid wastes, low in production cost, simple and fast in construction, safe, durable and non-combustible and has good construction performance and mechanical property, excellent heat preservation property and fireproof performance, A-grade fire resistance and good economic benefits and social benefits.

IPC
C04B 14/22 (2006.01)
C04B 18/30 (2006.01)
C04B 28/04 (2006.01)
The invention discloses a thermal-insulation and toughened burn-free colliery wastes brick. The thermal-insulation and toughened burn-free colliery wastes brick is characterized by being prepared from the following raw materials in parts by weight: 50-60 parts of colliery wastes, 7.5-9.5 parts of Portland cement, 1-2 parts of sodium bicarbonate, 10-12 parts of riverway sludge, 4-6 parts of waste glass powder, 2-3 parts of calcined lime, 7-9 parts of papermaking black liquid, 4-5 parts of EVA emulsion, 2-3 parts of expanded glass bead, 4-5 parts of palm skin, 7-9 parts of modifier and a proper amount of water. The colliery wastes brick is reasonable in formula. By adding the palm skin, the colliery wastes brick is light and porous and the toughness of the product is enhanced; by adding the expanded glass bead, the thermal insulation property of the product is enhanced; and by adding the modifier prepared by a special process, the brick has the effects of lightness, thermal insulation, sound absorption and antibacterial property, and the comprehensive performance of the colliery wastes brick is enhanced. By utilizing the burn-free process, the environmental pollution is reduced, and the energy consumption is lowered; besides, the brick is light, good in toughness and high in tensile strength, has the function of wall thermal insulation, and is beneficial for thermal insulation of building walls.
PROBLEM TO BE SOLVED: To provide a disassembly method of a solar battery panel which is safe and efficient, and takes a short time.

SOLUTION: In recycling a solar battery panel, a protection glass, a solar battery element, a wiring member, and a rear surface protection material of the solar battery panel are separated from EVA resin as a sealing material. A recycling method of the solar battery panel includes a process of separating the EVA resin from the protection glass, the solar battery element, the wiring member, and the rear surface protection material by significantly increasing fluidity of the EVA resin by boiling the EVA resin without being carbonized by irradiating with a light beam at a specific output from a short distance.
Title (en)
RECYCLING METHOD OF SOLAR BATTERY PANEL

Application
JP 2014115203 A 20140603

Publication
JP 2015229126 A 20151221

Abstract (en)
PROBLEM TO BE SOLVED: To provide an efficient disassembling method of a solar battery panel safely in a short time. SOLUTION: Separation of a protective glass 1 of a solar battery panel, a solar battery element 3 and a wiring member 5, a back surface protective material 4 and an EVA resin as an encapsulation material 2 is performed by applying an optical beam from a close distance with a specified output power while remarkably enhancing fluidity of the EVA resin in a boiled state without carbonizing the EVA resin and, further, by blowing hot air ejected at a high pressure into a gap between the protective glass 1, and the solar battery element 3 and the wiring member 5, and a gap between the solar battery element 3 and the wiring member 5, and the back surface protective material 4, the EVA resin, the protective glass 1, the solar battery element 3 and the wiring member 5 and the back surface protective material 4 are separated.

IPC
B09B 3/00 (2006.01)
B09B 5/00 (2006.01)
H01L 31/048 (2006.01)
The invention discloses a method for recycling a crystalline silicon solar cell module. The method includes the following specific technological steps: first, an aluminum frame and a junction box of a solar cell panel are demounted in a mechanical demounting manner; secondly, a cutting device is used for cutting off a peripheral edge rubber sealing strip of the solar cell panel with the aluminum frame and the junction box being demounted; thirdly, the cutting device is used for separating ultra-white glass, an EVA film, a battery piece, a backboard film, and a backboard of the solar cell panel with the peripheral edge rubber sealing strip being removed; fourthly, the separated battery piece and cross-linked EVA are dissolved in a solvent, so that a solar cell chip is separated; and fifthly, the solar cell chip is treated through a chemical method, and therefore a silicon material and silver powder are obtained. By means of design of the technological steps, crystalline silicon solar cell module resources can be effectively recycled, the energy-saving and environment-friendly effects are good, and social and economic benefits are good.
METHOD FOR RECYCLING SILICON FROM WASTE SOLAR MODULE

The present invention relates to a method of recovering silicon from a waste solar module. According to the present invention, a method of recovering silicon from a waste solar module is configured to include: a cooling step of maintaining a waste solar module configured to include a silicon layer (200) and an EVA layer (100) on both sides of the silicon layer (200) below a glass transition temperature of the EVA layer (100) for a certain time, so the elastic modulus of the EVA layer (100) is 560N/mm²; and a separating step of physically pulling and separating the EVA layer (100) of the cooled waste solar module from the silicon layer (200). The present invention finds an optimum condition for recovering silicon that is a core material of a solar cell module to recover silicon most efficiently, thus being able to recycle the silicon as a material of a solar cell at a low cost without any damage and to easily separate glass and back sheet to be recycled.
PROBLEM TO BE SOLVED: To provide, in recycling of a solar battery panel, a method for recovering an outer frame, glass, a solar battery cell, and an interconnector at a low cost in short time while completely decomposing a polymer such as EVA in the solar battery panel to remove the outer frame.

SOLUTION: In a state that, on a solar battery panel which is an object to be treated, an outer frame of the solar battery panel is attached, an oxide semiconductor is brought into contact with a back sheet of the solar battery panel, and in presence of oxygen, the object to be treated is heated at a temperature in which the oxide semiconductor serves as an intrinsic electric conductive region, thereby, a polymer such as EVA in the solar battery panel is completely decomposed into water and carbonic acid gas to recover the outer frame, glass, a solar battery cell, and an interconnector from a decomposition object.

SELECTED DRAWING: Figure 1

IPC
B09B 3/00 (2006.01)
B09B 5/00 (2006.01)
A method for recycling crystalline silicon solar cell assemblies, comprising the following process steps: a. disassembling an aluminum frame and a junction box from a solar panel by means of a mechanical disassembling approach; b. removing, by a cutting device, rubber seals around the edges of the solar panel with the aluminum frame and the junction box disassembled; c. separating, by the cutting device, ultra-clear glass, an EVA film, a cell sheet, a back sheet film, and a back sheet from the solar panel with the rubber seals around the edges removed; d. dissolving the cell sheet obtained by separation and the cross-linked EVA in a solvent to obtain a solar cell chip; and e. processing the solar cell chip by a chemical method to obtain a silicon material and silver powder. By means of the design of the process steps, resources of crystalline silicon solar cell assemblies can be effectively recycled, thereby achieving desirable energy saving and environmental protection effects as well as high social and economic benefits.