CLAIMS

1. A tree-shaped solar cell module comprising:

the tree-shaped solar cell module (400):

the triangular branch module (100) coupled to the tree-shaped solar cell module (400);

the triangular frame (10) being a basic fame of the triangular branch modules (100);

the internal cavity (16) formed in the triangular frame (10);

the assembly space regions (12) and the jaws (13) at boundaries of the assembly space regions (12), the assembly space regions (12) being formed in three sides of the triangular frame (10) and having a depth of 5 mm to 10 mm;

the wire accommodation grooves (14) formed in the assembly space regions (12) and having a depth toward the internal cavity (16);

penetration holes formed from the wire accommodation grooves (14) to the internal cavity (16);

the fixing plate (24) provided on the fixing part 26 which is located on an end of the triangular frame (10);

the wire hole (25) formed through the fixing plate (24) and connected to the internal cavity (16); and

the fixing hole (27) formed in an edge portion of the fixing plate (24).

2. The tree-shaped solar cell module of claim 1, wherein the internal cavity (16) is not formed in the triangular frame (10), or the triangular frame (10) has a circular or polygonal shape.

3. The tree-shaped solar cell module of claim 1, wherein the fixing plate (24) is not flat but has an arc shape so as to be easily attached to a circular pillar having a corresponding diameter.

4. The tree-shaped solar cell module of claim 1, wherein the triangular frame (10) makes an angle of 100 degrees or less with the fixing plate (24) provided on the fixing part (26)

formed on the end of the triangular frame (10).

5. The tree-shaped solar cell module of claim 1, wherein the triangular frame (10) is fixed in a manner such that the three sides of the triangular frame (10) are located at 0-degree, 120-degree, and 240-degree positions, or are located at 60-degree, 180-degree, and 300-degree positions based on the fixing plate (24) provided on the fixing part (26) formed on the end of the triangular frame (10).

6. The tree-shaped solar cell module of claim 1, wherein the simple solar cell modules (22) are attached to the assembly space regions (12), edges of the simple solar cell modules (22) are bonded to the jaws (13), wires of the simple solar cell modules (22) are arranged in the wire accommodation grooves (14) and introduced into the internal cavity (16) through the penetration holes and are pulled out through the wire hole 25 as the connection wires 30, and the connection plug (31) are connected to ends of the connection wires (30) so as to install the simple solar cell modules (22) to the triangular branch modules (100) .

7. The tree-shaped solar cell module of claim 6, wherein the sheets (17), the solar cells (18), and the transparent glass plates (19) are sequentially attached to the assembly space regions (12) instead of the simple solar cell modules (22).

8. The tree-shaped solar cell module of claim 6, wherein the LED modules are attached to the assembly space regions (12) instead of the simple solar cell modules (22).

9. The tree-shaped solar cell module of claim 6, wherein the reflection modules are attached to the assembly space regions (12) instead of the simple solar cell modules (22).

10. A tree-shaped solar cell module comprising:

the tree-shaped solar cell module (400):

the quadrangular branch module (110) or the rhombus branch module (120) coupled to the tree-shaped solar cell module (400);

the quadrangular frame (10a) being a basic fame of the quadrangular branch module (110) or the rhombus branch module (120);

the internal cavity (16) formed in the quadrangular frame (10a);

the assembly space regions (12) and the jaws (13) at boundaries of the assembly space regions (12), the assembly space regions (12) being formed in four sides of the quadrangular frame (10a) and having a depth of 5 mm to 10 mm;

the wire accommodation grooves (14) formed in the assembly space regions (12) and having a depth toward the internal cavity (16);

penetration holes formed from the wire accommodation grooves (14) to the internal cavity (16);

the fixing plate (24) provided on the fixing part 26 which is located on an end of the quadrangular frame (10a);

the wire hole (25) formed through the fixing plate (24) and connected to the internal cavity (16); and

the fixing hole (27) formed in an edge portion of the fixing plate (24).

11. The tree-shaped solar cell module of claim 10, wherein the four sides of the quadrangular frame (10a) are located at 0-degree, 90-degree, 180-degree, and 270-degree positions based on the fixing plate (24) provided on the end of the quadrangular frame (10a).

12. The tree-shaped solar cell module of claim 10, wherein the four sides of the quadrangular frame (10a) are located at 45-degree, 135-degree, 225-degree, and 315-degree positions based on the fixing plate (24) provided on the end of the quadrangular frame (10a).

13. A tree-shaped solar cell module comprising:

the module auxiliary frame (50); and

the simple solar cell module (22) attached to the assembly space region (12), wherein wires of the simple solar cell module (22) are arranged in the wire accommodation groove (14), and the jaws (13) and edges of the simple solar cell module (22) are bonded to each other.

14. A tree-shaped solar cell module comprising a branch module or a trunk module in which the back side (54) of the module auxiliary frame (50) to which the simple solar cell module (22) is attached is in contact with each side (42) of the polygonal pillar.

15. The tree-shaped solar cell module of claim 14, wherein the module auxiliary frame (50) is the module auxiliary frame (50b), and the polygonal pillar is the circular pillar (40d).

16. A tree-shaped solar cell module comprising:
the module auxiliary frame (50b) comprising the assembly space region (12); and
the simple solar cell module (22c) attached to the assembly space region (12), wherein edges of the simple solar cell module (22c) and the jaws (13) are bonded by silicone.

17. A tree-shaped solar cell module comprising:
the circular pillar (40d) having ends in a length direction, the ends having different diameters; and
the module auxiliary frame (50b) having ends in a length direction, the ends of the module auxiliary frame (50b) having different widths in proportion to the different diameters.

18. The tree-shaped solar cell module of claim 17, wherein jaws (13) formed at both ends of an assembly space region (12) of the module auxiliary frame (50b) have the same length and different widths.

19. A tree-shaped solar cell module comprising:
the tree-shaped solar cell module (700);

the branch module (140) coupled to the tree-shaped solar cell module (700);

the branch module frame (60) being a basic fame of the branch modules (140);

the assembly space region (12) and the jaws (13) at boundaries of the assembly space region (12), the assembly space region (12) being formed in the branch module frame (60) and having a depth of 5 mm to 10 mm;

the wire accommodation groove (14) formed in the assembly space region (12);

the reinforcing frame (66) formed in one piece with the one-piece part (64) on a back side of the branch module frame (60);

an internal space region (67) provided in the reinforcing frame (66); and

the bolt hole (68) formed in the reinforcing frame (66) so that the internal space region (67) is exposed to an outside.

20. The tree-shaped solar cell module of claim 19, wherein the branch module frame (60) comprises the branch module curve frame (60d) having an arc shape.

21. The tree-shaped solar cell module of claim 19, wherein the branch module frame comprises two parts having a coupling angle of 120 degrees or three parts having a coupling angle of 135 degrees at the one-piece part formed in one piece with the reinforcing frame (66).

22. The tree-shaped solar cell module of claim 19, wherein the gap (72) is formed in the reinforcing frame (66) in a length direction thereof to open the internal space region (67), the fixing tabs (70, 71) protrude from both sides of the gap (72), and a plurality of fixing bolt holes (73) are formed in sides of the fixing tabs (70, 71).

23. A tree-shaped solar cell module comprising:

the tree-shaped solar cell module (400):

a trunk module (200) of the tree-shaped solar cell module (400);

the internal cavity or internal space region formed in the trunk module (200);

a wire hole (80) and a nut hole (84) formed in an outer side of the trunk module (200);

the main wire (38) and the connection plug (31), the main wire (38) being disposed in the fixing plate (81) provided on a lower end of the trunk module (200) and the internal cavity or the internal space region, the connection plug (31) being attached to an end of the main wire (38) pulled out to a lower side of the fixing plate 81; and

a connection wire (33) and a connection socket (34) provided on an end of the connection wire (33), the connection wire (33) being electrically connected to the main wire (38) and pulled out through the wire hole (80).

24. A tree-shaped solar cell module comprising:

the tree-shaped solar cell module (400): and

the rhombus branch module (120) provided on an outside of the trunk module (200) by coupling the connection plug (31) of the connection wire (30) of the rhombus branch module (120) to the connection socket (34) of the connection wire (33) of the trunk module (200), aligning the fixing holes (27) of the fixing plate (24) of the rhombus branch module (120) with the nut holes (84) of the trunk module (200), and tightening bolts therethrough.

25. The tree-shaped solar cell module of claim 24, wherein an o-ring or a silicone adhesive is disposed or applied between the fixing plate (24) of the rhombus branch module (120) and a fixing part of the trunk module (200) in which the nut holes (84) are formed, for reliable sealing and fixing.

ABSTRACT

TREE-SHAPED SOLAR CELL MODULE

A tree-shaped solar cell module includes branch modules and a trunk module which are assembled with each other into the tree-shaped solar cell module. Each branch of the tree-shaped solar cell module has high strength to be prevented from being shaken with wind, and each branch does not have twigs or leaves and is thus prevented from being shaken by wind. Each branch may have an circular or polygonal shape such as a triangular shape or a quadrangular shape so that sunlight may evenly come to the tree-shaped solar cell module. Like branches of a tree which are directed upwardly, downwardly or horizontally, the branch modules may be assembled in such a manner that the branch modules have angles in a horizontal, upward or downward direction from the trunk module. The tree-shaped solar cell module may be installed in any sunny place even if it is a steep mountain with a large slope, a field of a flatland or a desert, and may be installed in a tree-planting manner without the need of reclamation and flattening of land. Grasses may grow all around the area where the tree-shaped solar cell module is installed to achieve a green area and the green area may be used as a ranch or a farm. If the tree-shaped solar cell module is installed in a desert area, it can be placed far away from the ground and less influenced by the radiant heat of the ground, thus preventing degradation of efficiency caused by high temperature. As the land of China is being rapidly desertified, the tree-shaped solar cell module of the present invention may be installed in the land of China to adjust the intensity of wind and thus limit sand transport and set up an environment that allows plants to grow, thus enabling solar generation that saves the earth.