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. The tree-shaped solar cell module of claim 10, wherein the assembly space regions (12) have a width of 50 mm to 300 mm.~~

~~14. The tree-shaped solar cell module of claim 10, wherein the quadrangular branch module (110) or the rhombus branch module (120) has a length of 1 m to 10 m.~~

~~15. A tree-shaped solar cell module comprising the quadrangular branch module (110) or the rhombus branch module (120) formed by attaching the simple solar cell modules (22) to the assembly space regions (12), bonding edges of the simple solar cell modules (22) to the jaws (13), arranging wires of the simple solar cell modules (22) in the wire accommodation grooves (14), introducing the wires into the internal cavity (16) through penetration holes, pulling the wires out through the wire hole 25 as the connection wires 30, connecting the connection plug (31) to ends of the connection wires (30) .~~

~~16. A tree-shaped solar cell module comprising a polygonal frame including the triangular frame (10), the quadrangular frame (10a), a pentagonal frame, a hexagonal frame, a heptagonal frame, an octagonal frame, or a circular frame, the polygonal frame comprises:~~

~~the internal cavity (16);~~

~~the assembly space region (12) and the jaws (13) at boundaries of the assembly space region (12); and~~

~~the wire accommodation groove (14) formed in the assembly space region (12) and depth toward the internal cavity (16).~~

~~17. The tree-shaped solar cell module of claim 16, wherein the polygonal frame does not comprise the assembly space region (12) and the jaws (13) but comprises a polygonal pillar.~~

~~18. A tree-shaped solar cell module comprising:~~

~~the module auxiliary frame (50);~~

~~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 a front side of the module auxiliary~~

~~frame (50) to a depth of 5 mm to 10 mm;~~

~~the wire accommodation groove (14) formed in the assembly space region (12) and having a depth toward the back side (54);~~

~~the wire accommodation groove (14) formed in the assembly space region (12) and having a depth toward the back side (54);~~

~~a screw assembly hole (53) formed at the wire accommodation groove (14) and penetrating the back side (54); and~~

~~the ends (55) formed at both sides of the jaws (13) and having a right angle.~~

~~19. The tree-shaped solar cell module of claim 18, wherein the back side (54) comprising a back side (54) having a shape corresponding to an outer shape of the side (42b).~~

~~20. The tree-shaped solar cell module of claim 18, wherein the ends (55) comprise the ends (55b) having an angle of 108, 110, 112.5, 115, 120, 126, 135, or 150 degrees.~~

~~21.~~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.

~~22.~~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.

~~23.~~15. The tree-shaped solar cell module of claim ~~22~~14, wherein the module auxiliary frame (50) is the module auxiliary frame (50b), and the polygonal pillar is the circular pillar (40d).

~~24~~.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.

~~25~~. 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.

~~26~~.18. The tree-shaped solar cell module of claim ~~25~~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.

~~27~~.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.

~~28.~~20. The tree-shaped solar cell module of claim ~~27~~19, wherein the branch module frame (60) comprises the branch module curve frame (60d) having an arc shape.

~~29.~~21. The tree-shaped solar cell module of claim ~~27~~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).

~~30.~~22. The tree-shaped solar cell module of claim ~~27~~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).

~~31.~~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).

~~32.~~ 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.

~~33.~~ 25. The tree-shaped solar cell module of claim ~~32~~ 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.

~~34. The tree-shaped solar cell module of claim 32, wherein the rhombus branch module (120) attached to the trunk module (200) is the triangular branch modules (100), the quadrangular branch module (110), or the circular branch module (130).~~

~~35. The tree-shaped solar cell module of claim 32, wherein the rhombus branch modules (120) attached to the trunk module (200) form layers, and the rhombus branch modules (120) of the layers are staggered.~~

~~36. A tree-shaped solar cell module comprising:~~

~~the trunk module (200);~~

~~the branch coupling parts (90) configured to be coupled to an outside of the wafer (200);~~

~~three sides of the branch coupling parts (90);~~

~~wire holes (96) and nut holes (97) formed in the three sides;~~

~~coupling plates (91) provided on the branch coupling parts (90); and~~

~~the coupling holes (95) formed in the coupling plates (91);~~

~~wherein if the branch coupling parts (90) are brought into contact with each other, the branch coupling parts (90) are brought into contact with each other and the coupling holes (95)~~

~~are aligned, and~~

~~the branch coupling parts (90) form an internal space region to dispose the trunk module (200) in the internal space region.~~

~~37. The tree-shaped solar cell module of claim 36, wherein the internal space region formed by the branch coupling parts (90) has a circular or polygonal shape.~~

~~38. A tree-shaped solar cell module comprising:~~

~~a one-piece support (35) formed in one-piece with an outer side of the trunk module (200);~~

~~the fixing plate (36) provided on an end of the one-piece support (35); and~~

~~a wire hole and a bolt hole formed in the fixing plate (36).~~

~~39. A tree-shaped solar cell module comprising:~~

~~the tree-shaped solar cell module (600):~~

~~the trunk module (200) of the tree-shaped solar cell module (600);~~

~~the quadrangular branch module (100), the rhombus branch module (120), or the circular branch module (130) coupled to an outer side of the trunk module (200);~~

~~the utility pole crossarm (2) and the transformer (5) provided on an upper portion of the trunk module (200);~~

~~the lightening rod (1) provided on the upper portion of the trunk module (200);~~

~~the traffic light coupling part (6) provided on the upper portion of the trunk module (200);~~

~~the traffic light support bar (7) and the traffic lights (8) provided on the traffic light coupling part (6); and~~

~~the streetlamp (9) provided on the traffic light coupling part (6).~~

~~40. The tree-shaped solar cell module of claim 39, wherein the simple solar cell module (22)~~

~~is provided on an outer side of at least one of the utility pole crossarm (2) and the traffic light support bar (7).~~

~~41. A tree-shaped solar cell module comprising:~~

~~the tree-shaped solar cell module (650):~~

~~the trunk module (200) of the tree-shaped solar cell module (650);~~

~~the flowerpot (77) provided on the fixing part (78) formed on at least one portion of an outer side of the trunk module (200); and~~

~~an internal space region formed in the flowerpot (77) and having an opened top side.~~

~~42. The tree-shaped solar cell module of claim 41, wherein the flowerpot (77) has a polygonal shape, and the opened top side of the flowerpot (77) is pointed upward.~~

~~43. The tree-shaped solar cell module of claim 41, wherein the capillary tube bundle is provided on a lower end of the internal space region of the flowerpot (77), and the capillary tube bundle extends to a lower side of the fixing plate (81) of the trunk module (200).~~

~~44. The tree-shaped solar cell module of claim 41, wherein the capillary tube bundle is formed of a stainless metal, a ceramic material including glass, a plastic, or a vinyl resin.~~

~~45. A tree-shaped solar cell module comprising:~~

~~the tree-shaped solar cell module (700);~~

~~the pillar (45) of the tree-shaped solar cell module (700);~~

~~the fixing rod disposed on an outer side of the pillar (45); and~~

~~the branch module (140), the branch module (150), the branch module (160), or the branch module (170) fixed to the fixing rod.~~

~~46. A tree-shaped solar cell module comprising the triangular branch modules (100), the~~

~~quadrangular branch module (110), the rhombus branch module (120), the circular branch module (130), the trunk module (200), or the pillar (45) that is straight, gradually curved, or gradually twisted in a length direction thereof.~~

~~47. A tree shaped solar cell module comprising the triangular frame (10), the quadrangular frame (10a), the hexagonal frame (10b), the octagonal frame (10c), or the circular frame (10d) that is formed of a metal, aluminum, stainless steel, a ceramic material, glass, concrete, a plastic, a resin, a vinyl resin, or a combination thereof.~~