Claims

1. A photovoltaic device (1a-d) comprising:
- a solar cell unit (2a; 2b) including:
a working electrode comprising a light-absorbing layer (3),
a counter electrode including a porous conductive layer (6), and
a conducting medium for transferring charges between the counter electrode and the working electrode, and
- an encapsulation (9) enclosing the solar cell unit (2a; 2b),
- a conductor (7) electrically connected to the porous conductive layer (6),
- a non-porous conducting barrier (14) disposed between the conductor (7) and the porous conductive layer (6),
- a first adhering layer (16) disposed between the porous conductive layer (6) and the conducting barrier (14) for attaching the conducting barrier (14) to the porous conductive layer (6), and
- a second adhering layer (17) arranged between the conducting barrier (14) and the conductor (7) for attaching the conductor to the conducting barrier (14), wherein the first and second adhering layers (8;8b;8a;16,17) comprises an adhesive (20) and conducting particles (22; 22a-b) distributed in the adhesive so that a conducting network is formed in the adhesive, and the encapsulation (9) surrounds the first and second adhering layers (16,17) and the conducting barrier (14).
~~characterized in that the solar cell unit (2a, 2b) comprises at least one adhering layer (8;8b;8a;16,17) arranged between the conductor (7) and the porous conductive layer (6) for attaching the conductor (7) to the porous conductive layer, and the adhering layer (8;8b;8a;16,17) comprises an adhesive (20) and conducting particles (22; 22a-b) distributed in the adhesive so that a conducting network is formed in the adhesive~~

2. The photovoltaic device according to claim 1, wherein ~~the photovoltaic device (1a-b) comprises an encapsulation (9) enclosing the solar cell unit (2a; 2b),~~ the encapsulation is provided with a penetration hole (12) comprising at least a part of said adhering layer (8;8b;8a;16,17) and the conductor (7) is attached to the adhering layer and extends on the outside of the encapsulation.

~~3.~~ The photovoltaic device according to claim 1~~2~~, wherein the encapsulation (9) comprises a gluing layer (11) for attaching the encapsulation to the solar cell unit (2a;2b), and the gluing layer (11) is made of the same material as said adhesive (20).

3.

~~4. The photovoltaic device according to any of the previous claims, wherein the solar cell unit (2a, 2b) comprises a non-porous conducting barrier (14) disposed between the conductor (7) and the porous conductive layer (6), and the at least one adhering layer comprises a first~~

~~adhering layer (16) disposed between the porous conductive layer (6) and the conducting barrier (14) for attaching the conducting barrier (14) to the porous conductive layer (6), and a second adhering layer (17) arranged between the conducting barrier (14) and the conductor (7) for attaching the conductor to the conducting barrier (14).~~

~~5. The photovoltaic device according to claim 4, wherein the photovoltaic device (1a-b) comprises an encapsulation (9) enclosing the solar cell unit (2a; 2b), and the encapsulation (9) surrounds the first and second adhering layers (16,17) and the conducting barrier (14).~~

~~6.~~4. The photovoltaic device according to claim 1 ~~4 or 5~~, wherein the conducting barrier (14) comprises titan or an alloy thereof.

~~7.~~5. The photovoltaic device according to ~~any of the previous~~ claim 1~~s~~, wherein the thickness of said adhering layer~~s~~ (~~8;8b;8a;~~16,17) is at least 3 µm, and preferably at least 5 µm, and most preferably at least 10 µm.

~~8.~~6. The photovoltaic device according to ~~any of the previous~~ claim 1~~s~~, wherein the adhering layer~~s~~ (~~8;8b;8a;~~16,17) comprises between 20 and 40 vol% of said conducting particles (22; 22a-b).

~~9.~~7. The photovoltaic device according to ~~any of the previous~~ claim 1~~s~~, wherein at least 80 wt-% of said conducting particles (22; 22a-b) have a size of 5 µm or less, and preferably at least 80 wt-% of said conducting particles have a size of 3 µm or less.

~~10.~~8. The photovoltaic device according to ~~any of the previous~~ claim 1~~s~~, wherein the adhering layer~~s~~ (~~8;8b;8a;~~16,17) comprises a mixture of conducting particles (22a) having a size less than 200 nm and conducting particles (22b) having a size larger than 1 µm.

~~11.~~9. The photovoltaic device according to ~~any of the previous~~ claim~~s~~ 1, wherein said adhesive (20) is polyethylene, or polypropylene, or ionomer or mixtures thereof.

~~12.~~10. The photovoltaic device according to claim 3, wherein said adhesive (20) and said gluing layer (11) comprises polyethylene.

~~13.~~11. The photovoltaic device according to ~~any of the previous~~ claim 1~~s~~, wherein said conducting particles (22; 22a-b) comprises carbon.

~~14.~~12. The photovoltaic device according to ~~any of the previous~~ claim 1~~s~~, wherein said conducting particles (22; 22a-b) are made of battery grade graphite and battery grade carbon black.

~~15.~~13. The photovoltaic device according to ~~any of the previous~~ claim~~s~~ 1, wherein the solar cell unit (1a;1b) comprises:

- a porous substrate (5) made of an insulating material,
- a upper conductive layer (4) formed on one side of the porous substrate (5) for extracting photo-generated electrons from the light-absorbing layer (3), and
- a second conductor (7b) in electrical contact with the upper conductive layer (4), a conducting part (23) of the porous substrate (5) comprises conducting material (24), and the photovoltaic device comprises at least one adhering layer (25;26,28) comprising said adhesive (2) including said conducting particles (22;22a,22b) and disposed between the second conductor (7b) and said conducting part (23) of the porous substrate for attaching the second conductor (7b) to the porous substrate (5).