Claims

1. A solar cell assembly, comprising:
adjacent layers defining an interior lumen,
sealant between the adjacent layers to seal the interior lumen, and
a solar cell within the sealed lumen,
characterised in that an external surface of the assembly is coated with a layer comprising tetrahedral hydrogen-free amorphous carbon, ta-C, said layer having a thickness of up to 50nm and an sp3 content of 60% or greater, and the solar cell is a perovskite solar cell.

2. A solar cell assembly according to claim 1, wherein said ta-C layer has an sp3 content of 70% or greater.

3. A solar cell assembly according to claim 1 or 2, wherein the coating layer comprising ta-C is present on one or more of the adjacent layers and/or the sealant.

4. A solar cell assembly according to any of claims 1 to 3, wherein the coating layer comprising ta-C is present at the junctions between the sealant and each of the adjacent layers.

5. A solar cell assembly according to any of claims 1 to 4, wherein the adjacent layers of the assembly are a front layer and a back layer, wherein the front layer is or comprises a substrate to which the solar cell is attached and/or on which the solar cell has been formed.

6. A solar cell assembly according to claim 5, wherein the back layer of the assembly comprises a coating of ta-C.

7. A solar cell assembly according to claim 5 or 6, wherein the coating layer comprising ta-C coats all of an outer edge of a front layer, an outer edge of a back layer and the sealant.

8. A solar cell assembly according to any preceding claim, wherein a front layer, and optionally a back layer, is made of or comprises a transparent material, for example glass, epoxy or polymer.

9. A solar cell assembly according to claim 8, wherein the transparent material is glass (e.g. soda-lime-silica glass).

10. A solar cell assembly according to any preceding claim, wherein the sealant is selected from epoxy resin, ethylene-vinyl acetate, epoxy resin, polyethylene ionomer, polydimethyl siloxane, poly (methyl methacrylate) (PMMA), thermoplastic polyurethane (TPU), and polyisobutylene, fluoro polymers (e.g. PTFE), polyethylene terephthalate, poly (vinyl alcohol-co-ethylene) (EVOH), paraffin, organo siloxane, silicone or any mixture thereof.

11. A solar cell assembly according to claim 10, wherein the sealant is epoxy resin.

12. A solar cell assembly according to any preceding claim, comprising two electrodes, a hole transport layer, an electron transport layer and perovskite.

13. A solar cell assembly according to claim 12, wherein the hole transport layer comprises metal oxides (e.g., NiO, Cu_2O, $CuGaO_2$), metal sulfides, metal oxysulfides and / or organic materials such as P3HT, PTAA and PEDOT:PSS, and the electron transport layer comprises PCBM, C60, TiO_2 or SnO_2.

14. A solar cell assembly according to any preceding claim, wherein the assembly is an encapsulated solar cell and all external surfaces thereof comprise a coating layer comprising ta-C.

15. A solar cell assembly according to claim 14, comprising a first electrode, a hole transport layer, perovskite, an electron transport layer and a second electrode.

16. A method of making a solar cell assembly according to any preceding claim, comprising:

(i) providing adjacent, e.g. front and back, layers that when sealed together define an interior lumen,

(ii) providing a perovskite solar cell between the layers,

(iii) locating sealant between the layers to seal the layers together and create a sealed interior lumen containing the solar cell,

(iv) applying a layer comprising ta-C to an external surface of the assembly.