

FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
AND
THE PATENTS RULES, 2003

**COMPLETE
SPECIFICATION**

(See Section 10; rule 13)

TITLE OF THE INVENTION

**“AUTOMATED FLEXIBLE SOLAR CELL FABRICATION AND
INTERCONNECTION UTILIZING ROLLS EXPANDED
METALLIC MESH”**

APPLICANT

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The following specification particularly describes
the invention and the manner in which
it is to be performed

CLAIMS

WHAT IS CLAIMED IS:

1. A method for forming a photovoltaic module, comprising:
 - (a) providing a first photovoltaic cell and a second photovoltaic cell, wherein an individual photovoltaic cell of said first and second photovoltaic cells comprises:
 - i. an expanded metallic mesh that is disposed adjacent to a top surface of a flexible thin film photoactive device; and
 - ii. an electrically insulating material disposed between said expanded metallic mesh and said flexible thin film photovoltaic device at an edge portion of said flexible thin film photoactive device; and
 - (b) bringing an expanded metallic mesh of said first photovoltaic cell in contact with an underside of said second photovoltaic cell, thereby electrically connecting the thin film photoactive devices of said photovoltaic cells to form said photovoltaic module.
2. The method of Claim 1, wherein said individual photovoltaic cell comprises an optically transparent film that secures said metallic mesh to said flexible thin film photoactive device.
3. The method of Claim 2, wherein said optically transparent film is a pressure sensitive adhesive.
4. The method of Claim 1, wherein said expanded metallic mesh is secured to said flexible thin film photovoltaic device by a conductive epoxy.
5. The method of Claim 1, wherein said expanded metallic mesh is attached to said flexible thin film photovoltaic device with a low melting point solder.
6. The method of Claim 1, wherein said expanded metallic mesh comprises holes.
7. The method of Claim 1, wherein a width of said expanded metallic mesh and said flexible thin film photovoltaic device is between about 1.5 inches and 6.0 inches.
8. The method of claim 1, wherein a thickness of said expanded metallic mesh is between about 0.002 inches and 0.01 inches.
9. The method of Claim 1, wherein said expanded metallic mesh comprises individual wire-like elements each having a width between about 0.002 inches and 0.006 inches.
10. The method of Claim 1, wherein said expanded metallic mesh is formed of copper.
11. The method of Claim 1, wherein said expanded metallic mesh includes one or more coatings.
12. The method of Claim 11, wherein said one or more coatings comprise nickel.

13. The method of Claim 11, wherein said one or more coatings comprise tin.
14. The method of Claim 1, wherein said flexible thin film photovoltaic device comprises a photoactive material adjacent to a flexible substrate.
15. The method of Claim 14, wherein said flexible substrate comprises stainless steel.
16. The method of Claim 1, wherein bringing said expanded metallic mesh of said first photovoltaic cell in contact with an underside of said second photovoltaic cell comprises wrapping said expanded metallic mesh around an edge portion of said first photovoltaic cell.
17. The method of Claim 1, wherein said expanded metallic mesh overlaps one edge of said flexible thin film photovoltaic device but not an opposing edge of said flexible thin film photovoltaic device.
18. A method for forming photovoltaic cells, comprising:
 - (a) providing a first roll of a photovoltaic material and a second roll of an expanded metallic mesh, wherein the photovoltaic material comprises a photoactive material adjacent to a flexible substrate, and wherein said expanded metallic mesh comprises a plurality of openings;
 - (b) providing an electrically insulating material adjacent to an edge portion of said photovoltaic material;
 - (c) bringing said photovoltaic material from said first roll in proximity to said expanded metallic mesh from said second roll to form a nascent photovoltaic cell, wherein said electrically insulating material is disposed between said expanded metallic mesh and said photovoltaic material; and
 - (d) cutting the nascent photovoltaic cell into individual sections to form a plurality of photovoltaic cells.
19. The method of Claim 18, wherein providing said electrically insulating material in (b) comprises bringing said electrically insulating material from a third roll in proximity to said photovoltaic material from said first roll.
20. The method of Claim 18, wherein (c) further comprises bring a securing member from a fourth roll in proximity to said expanded metallic mesh, wherein said securing member secures the expanded metallic mesh against said photovoltaic material.
21. The method of Claim 18, further comprising integrating said plurality of photovoltaic cells into a photovoltaic module.
22. The method of Claim 18, wherein (c) further comprises directing said photovoltaic material and said expanded metallic mesh into a vacuum drum to press the photovoltaic material against said expanded metallic mesh.

23. The method of Claim 18, wherein (c) further comprises cutting said expanded metallic mesh into individual sections prior to bringing said photovoltaic material in proximity to said expanded metallic mesh.
24. A photovoltaic cell, comprising:
 - (a) a photovoltaic device comprising a flexible substrate adjacent to a photoactive material;
 - (b) an expanded metallic mesh adjacent to a top surface of said photovoltaic device, wherein said expanded metallic mesh comprises a plurality of holes for permitting electromagnetic radiation to come in contact with said photoactive material; and
 - (c) an electrically insulating material disposed between said expanded metallic mesh and said photovoltaic device at an edge portion of said photovoltaic device.
25. The photovoltaic cell of Claim 24, further comprising an optically transparent film that secures said expanded metallic mesh to said photovoltaic device.
26. The photovoltaic cell of Claim 25, wherein said optically transparent film is a pressure sensitive adhesive.
27. The photovoltaic cell of Claim 24, wherein said expanded metallic mesh is secured to said photovoltaic device by a conductive epoxy.
28. The photovoltaic cell of Claim 24, wherein said expanded metallic mesh is attached to said photovoltaic device by a low melting point solder.
29. The photovoltaic cell of Claim 24, wherein a width of said expanded metallic mesh is between about 1.5 inches and 6.0 inches.
30. The photovoltaic cell of Claim 24, wherein a thickness of said expanded metallic mesh is between about 0.002 inches and 0.01 inches.
31. The photovoltaic cell of Claim 24, wherein said expanded metallic mesh comprises individual wire-like elements each having a width between about 0.002 inches and 0.006 inches.
32. The photovoltaic cell of Claim 24, wherein said expanded metallic mesh comprises copper.
33. The photovoltaic cell of Claim 24, wherein said expanded metallic mesh includes one or more coatings.
34. The photovoltaic cell of Claim 33, wherein said one or more coatings comprise nickel.
35. The photovoltaic cell of Claim 33, wherein said one or more coatings comprise tin.

36. The photovoltaic cell of Claim 24, wherein said flexible substrate comprises stainless steel.
37. The photovoltaic cell of Claim 24, wherein said expanded metallic mesh overlaps one edge of said photovoltaic device but not an opposing edge of said photovoltaic device.

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