method also includes placing a first solar cell on the first encapsulant. The method includes placing a metal foil on the first solar cell, where the metal foil uniformly contacts the first solar cell and forming a metal bond that couples the metal foil to the first solar cell, wherein the method further comprises placing a second solar cell on the first encapsulant, and wherein before placing a first solar cell on the first encapsulant, sorting a plurality of solar cells according to at least one of visual quality, photoluminescence and electroluminescence test results, wherein placing the first and second solar cells is performed according to the sorting. The method can further include placing a backing material on the metal foil, forming a back layer on the backing material and bonding the substantially transparent layer, first encapsulant, first solar cell, metal foil, backing material and back layer to form a photovoltaic laminate.

[0005] According to another aspect of the invention another method for metallization of a photovoltaic laminate is disclosed,the photovoltaic laminate having a front side which faces the sun during normal operation and a back side opposite the front side, the method comprising placing a first encapsulant on a substantially transparent layer that comprises the front side of the photovoltaic laminate; placing a first solar cell on the first encapsulant; placing a metal foil on the first solar cell, wherein the metal foil uniformly contacts a back side of the first solar cell; forming a metal bond that couples the metal foil to the first solar cell; placing a backing material on the metal foil; forming a back layer on the backing material layer; and curing the substantially transparent layer, first encapsulant, first solar cell, metal foil, backing material and back layer to form a photovoltaic laminate wherein the method further comprises placing a second solar cell on the first encapsulant, and wherein before placing a first solar cell on the first encapsulant, sorting a plurality of solar cells according to at least one of visual quality, photoluminescence and electroluminescence test results, wherein placing the first and second solar cells is performed according to the sorting. According to another aspect of the invention another method for metallization of photovoltaic laminate is provided the method includes placing a metal foil on a receiving medium placing a first solar cell of the metal foil and forming a metal bond that couples the metal foil to the first solar cell

wherein the method further comprises before placing a first solar cell on metal foil, sorting a plurality of solar cells according to at least one of visual quality, photoluminescence and electroluminescence test results, wherein placing the first and cells is performed according to the sorting. In some embodiments the receiving medium can include a receiving medium selected from the group composed of a substantially transparent layer, sacrificial glass and a perforated medium. The method can include placing a first solar cell on the metal foil. The method can include forming a metal bond that couples the metal foil to the first solar cell. In an embodiment, forming a metal bond can include firing a laser through the receiving medium to the metal foil to form a metal bond or a metal contact region that couples the metal foil to the first solar cell. The method can further include placing a first encapsulant on the first solar cell and placing a substantially transparent layer on the first encapsulant. The method can also include placing a backing material on the metal foil, placing a back layer on the backing material and bonding the substantially transparent layer, first encapsulant, first solar cell, metal foil, backing material and back layer together forming a photovoltaic laminate.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] A more complete understanding of the subject matter may be derived by referring to the detailed description and claims when considered in conjunction with the following figures, wherein like reference numbers refer to similar elements throughout the figures.

[0007] FIGS. 1-7 are cross-sectional representations of a photovoltaic laminate in accordance with a presented method for metallization of a photovoltaic laminate;

[0008] FIGS. 8-15 are cross-sectional representations of a photovoltaic laminate in accordance with another presented method for metallization of a photovoltaic laminate;

[0009] FIGS. 16-23 are schematic plan views of a solar cell in accordance with the presented methods of FIGS. 1-15 for metallization of a photovoltaic laminate; and

CLAIMS

What is claimed is:

1. A method for metallization for a photovoltaic laminate, the method comprising:

placing a first encapsulant on a substantially transparent layer;

placing a first solar cell on the first encapsulant;

placing a metal foil on the first solar cell, wherein the metal foil uniformly contacts the first solar cell; and

forming a metal bond that couples the metal foil to the first solar cell, wherein the method further comprises placing a second solar cell on the first encapsulant, and wherein before placing a first solar cell on the first encapsulant, sorting a plurality of solar cells according to at least one of visual quality, photoluminescence and electroluminescence test results, wherein placing the first and second solar cells is performed according to the sorting.

2. The method of Claim 1 further comprising:

placing a backing material on the metal foil;

forming a back layer on the backing material; and

bonding the substantially transparent layer, first encapsulant, first solar cell, metal foil, backing material and back layer to form a photovoltaic laminate.

~~3. The method of Claim 1, further comprising placing a second solar cell on the first encapsulant.~~

~~4. The method of Claim 3, further comprising before placing a first solar cell on the first encapsulant, sorting a plurality of solar cells, wherein placing the first and second solar cells is performed according to the sorting.~~

35. The method of Claim 1, wherein forming the metal bond includes forming a metal contact region using a laser source, wherein the

formed metal contact region electrically couples the metal foil to the first solar cell.

46. The method of Claim 1, wherein forming the metal bond comprises:

performing a patterning process resulting in patterned metal foil and excess metal foil;

forming a metal bond that couples the patterned metal foil to the first solar cell; and

removing the excess metal foil.

57. The method of Claim 1, wherein forming the metal bond comprises:

forming a metal bond that couples a metal foil attached to a carrier medium to the first solar cell, wherein the metal foil is pre-patterned; and

after forming the metal bond, removing the carrier medium.

68. The method of Claim 1, wherein bonding the substantially transparent layer, first encapsulant, first solar cell, metal foil, backing material and back layer to form a photovoltaic laminate includes performing a method selected from the group consisting of curing, thermal curing, curing with Ultra Violet light and performing a standard lamination process to form a photovoltaic laminate.

79. A method for metallization for a photovoltaic laminate, the photovoltaic laminate having a front side which faces the sun during normal operation and a back side opposite the front side, the method comprising:

placing a first encapsulant on a substantially transparent layer that comprises the front side of the photovoltaic laminate;

placing a first solar cell on the first encapsulant;

placing a metal foil on the first solar cell, wherein the metal foil uniformly contacts a back side of the first solar cell;

forming a metal bond that couples the metal foil to the first solar cell;

placing a backing material on the metal foil;

forming a back layer on the backing material layer; and

curing the substantially transparent layer, first encapsulant, first solar cell, metal foil, backing material and back layer to form a photovoltaic laminate, wherein the method further comprises placing a second solar cell on the first encapsulant, and wherein before placing a first solar cell on the first encapsulant, sorting a plurality of solar cells according to at least one of visual quality, photoluminescence and

electroluminescence test results, wherein placing the first and second solar cells is performed according to the sorting.

~~9~~10. A method for metallization of a photovoltaic laminate, the method comprising:

placing a metal foil on a receiving medium;

placing a first solar cell on the metal foil; and

forming a metal bond that couples the metal foil to the first solar cell, wherein the method further comprises before placing a first solar cell on metal foil, sorting a plurality of solar cells according to at least one of visual quality, photoluminescence and electroluminescence test results, wherein placing the first solar cells is performed according to the sorting.

911. The method of Claim 810 further comprising:

placing a first encapsulant on the first solar cell;

placing a substantially transparent layer on the first encapsulant;

placing a backing material on the metal foil;

placing a back layer on the backing material; and

bonding the substantially transparent layer, first encapsulant, first solar cell, metal foil, backing material and back layer together forming a photovoltaic laminate.

1012. The method of claim 810, wherein placing a metal foil on a receiving medium includes placing the metal foil on a receiving medium selected from the group consisting of a substantially transparent layer, sacrificial glass and a perforated medium.

1113. The method of Claim 810, wherein placing the first solar cell on the metal foil comprises placing a plurality of solar cells on the metal foil.

~~14. The method of Claim 10, further comprising before placing a first solar cell on metal foil, sorting a plurality of solar cells, wherein placing the first and cells is performed according to the sorting.~~

1215. The method of Claim 810, wherein forming the metal bond includes forming a metal bond using a laser source, wherein the formed metal bond electrically couples the metal foil to the first solar cell.

1346. The method of Claim 840, wherein forming a metal bond includes firing a laser through the receiving medium to the metal foil to form a metal bond that couples the metal foil to the first solar cell.

1447. The method of Claim 840, wherein forming the metal bond comprises:

performing a laser patterning process resulting in patterned metal foil and excess metal foil;

forming a metal bond that couples the patterned metal foil and the first solar cell; and

removing the excess metal foil.

1548. The method of Claim 840, wherein forming the metal bond comprises:

forming a metal bond that couples a metal foil attached to a carrier medium to the first solar cell, wherein the metal foil is pre-patterned; and

after forming the metal bond, removing the carrier medium.

1649. The method of Claim 840, wherein bonding the substantially transparent layer, first encapsulant, first solar cell, metal foil, backing material and back layer to form a photovoltaic laminate includes performing a method selected from the group consisting of curing, thermal curing, curing with Ultra Violet light and performing a standard lamination process to form a photovoltaic laminate.

1720. The method of Claim 840 further comprising:

placing a metal foil on a receiving medium, the receiving medium substantially transparent;

placing a first solar cell on the metal foil, wherein the metal foil uniformly contacts a back side of the first solar cell;

firing a laser through the receiving medium to the metal foil to form a metal bond that couples the metal foil to the first solar cell;

placing a first encapsulant on the first solar cell;

placing a substantially transparent layer on the first encapsulant;

placing a backing material on the metal foil;

placing a back layer on the backing material; and

curing the substantially transparent layer, first encapsulant, first solar cell, metal foil, backing material and back layer together forming a photovoltaic laminate.