METALLIZATION OF SOLAR CELLS USING METAL FOILS

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TECHNICAL FIELD

[0001] Embodiments of the subject matter described herein relate generally to solar cells. More particularly, embodiments of the subject matter relate to solar cell fabrication processes and structures.

BACKGROUND

[0002] Solar cells are well known devices for converting solar radiation to electrical energy. A solar cell has a front side that faces the sun during normal operation to collect solar radiation and a backside opposite the front side. Solar radiation impinging on the solar cell creates electrical charges that may be harnessed to power an external electrical circuit, such as a load. The external electrical circuit may receive electrical current from the solar cell by way of metal fingers that are connected to doped regions of the solar cell.

BRIEF SUMMARY

[0003] In one aspect, a method of fabricating a solar cell is provided, comprising forming a dielectric spacer on a surface of a solar cell structure, forming a metal layer on the dielectric spacer, an N-type doped region, and a P-type doped region, wherein the metal layer electrically connects the N-type doped region to the P-type doped region, placing a metal foil on the metal layer, and after placing the metal foil on the metal layer, patterning the metal foil, wherein patterning the metal foil includes removing portions of the metal foil and the metal layer that are over the dielectric spacer.

[0003a] In another aspect, a solar cell structure is provided, comprising an N-type doped region and a P-type doped region;

a dielectric spacer over the N-type doped region and the P-type doped region;

a metal layer over the dielectric spacer , the P-type doped region, and the N-type doped region, wherein the metal layer is electrically connected to the N-type doped region and the P-type doped region;

a metal foil over the metal layer, dielectric spacer and the P-type doped region, wherein the metal is configured to form a first metal foil finger and a second metal foil finger,;

the first metal foil finger and the second metal foil finger being configured to electrically bond to the metal layer.

10. A solar cell structure comprising:

an N-type doped region and a P-type doped region;

a dielectric spacer over the N-type doped region and the P-type doped region;

a metal layer over the dielectric spacer, the P-type doped region, and the N-type doped region, wherein the metal layer is electrically connected to the N-type doped region and the P-type doped region;

a metal foil over the metal layer, dielectric spacer and the P-type doped region, wherein the metal is configured to form a first metal foil finger and a second metal foil finger,

the first metal foil finger and the second metal foil finger being configured to electrically bond to the metal layer.

11. The solar cell structure of claim 10, wherein the solar cell comprises an all back contact solar cell.

12. The solar cell structure of claim 10, wherein the first and second metal foil fingers comprise aluminum.

13. The solar cell structure of claim 10, further comprising:

weld joints that attach the first metal foil finger and the second metal foil finger to the metal layer.

14. A method of fabricating a solar cell, the method comprising:

forming a dielectric spacer on a surface of a solar cell structure;

depositing a metal layer on portions of the surface of the solar cell structure that are exposed by the dielectric spacer;

fitting a metal foil to the metal layer; and

patterning the metal foil after fitting the metal foil to the metal layer.

15. The method of claim 14, further comprising:

welding the metal foil to the metal layer after fitting the metal foil to the metal layer but before patterning the metal foil.

16. The method of claim 14, wherein fitting the metal foil to the metal layer comprises placing a sheet of aluminum foil on the metal layer.

17. The method of claim 14, wherein patterning the metal foil comprises directing a laser beam on the metal foil to ablate the metal foil and the metal layer.

18. The method of claim 14, wherein depositing the metal layer on the dielectric spacer comprises depositing a blanket layer of metal on the dielectric spacer.