BONDS FOR SOLAR CELL METALLIZATION

BACKGROUND

[0001] Photovoltaic cells, commonly known as solar cells, are well known devices for direct conversion of solar radiation into electrical energy. Generally, solar cells are fabricated on a semiconductor wafer or substrate using semiconductor processing techniques to form a p-n junction near a surface of the substrate. Solar radiation impinging on the surface of, and entering into, the substrate creates electron and hole pairs in the bulk of the substrate. The electron and hole pairs migrate to p-doped and n-doped regions in the substrate, thereby generating a voltage differential between the doped regions. The doped regions are connected to conductive regions on the solar cell to direct an electrical current from the cell to an external circuit.

[0002] Efficiency is an important characteristic of a solar cell as it is directly related to the capability of the solar cell to generate power. Likewise, efficiency in producing solar cells is directly related to the cost effectiveness of such solar cells. Accordingly, techniques for increasing the efficiency of solar cells, or techniques for increasing the efficiency in the manufacture of solar cells, are generally desirable. Some embodiments of the present disclosure allow for increased solar cell manufacture efficiency by providing novel processes for fabricating solar cell structures. Some embodiments of the present disclosure allow for increased solar cell efficiency by providing novel solar cell structures.

SUMMARY

[0002a] According to a first aspect, a solar cell is provided, comprising a substrate; a semiconductor region disposed in or above the substrate; and a conductive foil thermally compressed to the semiconductor region.

[0002b] According to a second aspect, a method of fabricating a solar cell is provided, comprising placing a conductive foil over a semiconductor region disposed in or above a substrate; heating the conductive foil; applying mechanical force to the heated conductive foil to form a conductive bond for the solar cell.

[0002c] According to a third aspect, a method of fabricating a solar cell is provided, comprising forming a first metal region over a semiconductor region disposed in or above a substrate; placing a conductive foil over the first metal region; bonding the conductive foil to the first metal region; and patterning the conductive foil and the first metal region.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Figures 1A and 2A illustrate cross-sectional views of a portion of example solar cells having conductive contacts formed on emitter regions formed above a substrate, according to some embodiments.

[0004] Figures 1B and 2B illustrate cross-sectional views of a portion of example solar cells having conductive contacts formed on emitter regions formed in a substrate, according to some embodiments.

[0005] Figure 3 is a flowchart illustrating an example method of forming a conductive contact, according to one embodiment.

[0006] Figures 4A and 4B illustrate cross-sectional views of forming a conductive contact in an embodiment with a sputtered first metal region.

19. The method of claim 18, wherein said bonding includes forming an intermetallic compound from the conductive foil and the second metal region.

20. The method of claim 17, further comprising applying an ultrasonic agitation technique to the conductive foil and first metal region.

~~21. The method of claim 17, wherein said patterning the conductive foil includes:~~
~~printing a mask over regions of the conductive foil; and~~
~~applying a chemical etch.~~

~~22. The method of claim 17, wherein said patterning the conductive foil includes:~~
~~laser grooving regions of the conductive foil to remove a majority of a thickness of the regions; and~~
~~applying a chemical etch.~~

~~23. The method of claim 17, wherein said patterning the conductive foil includes:~~
~~applying a non-patterned mask across the conductive foil;~~
~~patterning the non-patterned mask; and~~
~~applying a chemical etch.~~

~~24. The method of claim 17, wherein said patterning the conductive foil includes:~~
~~laser patterning an etch resistant coating of the conductive foil; and~~
~~applying a chemical etch~~.