

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] In a first aspect, the present disclosure provides a solar cell, comprising: a substrate; a semiconductor region disposed above and insulated from the substrate; and a conductive foil thermally compressed to the semiconductor region.

[0002b] In a second aspect, the present disclosure provides a solar cell, comprising: a single crystalline silicon substrate; a doped silicon region disposed in the single crystalline silicon substrate; a conductive foil thermally compressed to the doped silicon region; a first metal between the conductive foil and the doped silicon region; and a second metal between the conductive foil and the first metal.

[0002c] In a third aspect, the present disclosure provides a solar cell, comprising: a single crystalline silicon substrate; a doped polycrystalline silicon layer disposed above the single crystalline silicon substrate; an oxide layer between the single crystalline silicon substrate and

the doped polycrystalline silicon layer; and a conductive foil thermally compressed to the doped polycrystalline silicon layer.

[0002d] In a fourth aspect, the present disclosure provides a solar cell, comprising: a substrate; a semiconductor region disposed in or above the substrate; a conductive foil thermally compressed to the semiconductor region; a first metal between the conductive foil and the semiconductor region; and a second metal between the conductive foil and the first metal.

[0002e] In a fifth aspect, the present disclosure provides a solar cell, comprising: a single crystalline silicon substrate; a doped silicon region disposed in the single crystalline silicon substrate; and a conductive foil thermally compressed to the doped silicon region, wherein the conductive foil is an aluminum foil coated in copper.

[0002f] In a sixth aspect, the present disclosure provides a solar cell, comprising: a single crystalline silicon substrate; a doped polycrystalline silicon layer disposed above the single crystalline silicon substrate; a conductive foil thermally compressed to the doped polycrystalline silicon layer; a first metal between the conductive foil and the doped polycrystalline silicon layer; and a second metal between the conductive foil and the first metal.

[0002g] In a seventh aspect, the present disclosure provides a solar cell, comprising: a substrate; a semiconductor region disposed above and insulated from the substrate; and a conductive wire thermally compressed to the semiconductor region.

[0002h] In an eighth aspect, the present disclosure provides a solar cell, comprising: a single crystalline silicon substrate; a doped silicon region disposed in the single crystalline silicon substrate; a conductive wire thermally compressed to the doped silicon region; a first metal between the conductive wire and the doped silicon region; and a second metal between the conductive wire and the first metal.

[0002i] In a ninth aspect, the present disclosure provides a solar cell, comprising: a single crystalline silicon substrate; a doped polycrystalline silicon layer disposed above the single crystalline silicon substrate; an oxide layer between the single crystalline silicon substrate and the doped polycrystalline silicon layer; and a conductive wire thermally compressed to the doped polycrystalline silicon layer.

[0002j] In a tenth aspect, the present disclosure provides a solar cell, comprising: a substrate; a semiconductor region disposed in or above the substrate; a conductive wire thermally compressed to the semiconductor region; a first metal between the conductive wire and the semiconductor region; and a second metal between the conductive wire and the first metal.

[0002k] In an eleventh aspect, the present disclosure provides a solar cell, comprising: a single crystalline silicon substrate; a doped silicon region disposed in the single crystalline

silicon substrate; and a conductive wire thermally compressed to the doped silicon region, wherein the conductive wire is an aluminum wire coated in copper.

[00021] In a twelfth aspect, the present disclosure provides a solar cell, comprising: a single crystalline silicon substrate; a doped polycrystalline silicon layer disposed above the single crystalline silicon substrate; a conductive wire thermally compressed to the doped polycrystalline silicon layer; a first metal between the conductive wire and the doped polycrystalline silicon layer; and a second metal between the conductive wire and the first metal.

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.