SOLAR CELLS WITH TUNNEL DIELECTRICS

BACKGROUND

[0001] Photovoltaic (PV) cells, commonly known as solar cells, are well known devices for conversion of solar radiation into electrical energy. Generally, solar radiation impinging on the surface of, and entering into, the substrate of a solar cell 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 creating a voltage differential between the doped regions. The doped regions are connected to the 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 solar cell's capability to generate power. Accordingly, techniques for improving the fabrication process, reducing the cost of manufacturing and increasing the efficiency of solar cells are generally desirable. Such techniques can include forming improved contact regions of solar cells to increase electrical conduction and solar cell efficiency.

SUMMARY

[002a] According to an aspect, a solar cell is provided, comprising a first dielectric formed over a first portion of the silicon substrate; a second dielectric formed over second portion of the silicon substrate, wherein the first dielectric is a different type of dielectric than the second dielectric; a doped semiconductor formed over the first and second dielectric; a positive-type metal contact formed over the doped semiconductor and the first dielectric; and a negative-type metal contact formed over the doped semiconductor and over the second dielectric.

[0002b] According to another aspect, a solar cell is provided, comprising a first dielectric formed over a first doped region of a silicon substrate; a second dielectric formed over a second doped region of the silicon substrate, wherein the first dielectric is a different type of dielectric than the second dielectric; a first doped polysilicon formed over the first dielectric; a second doped polysilicon formed over the second dielectric; a positive-type metal contact formed over the first doped polysilicon; and a negative-type metal contact formed over the second doped polysilicon.

[0002c] According to an aspect, a solar cell is provided, comprising silicon nitride formed over a P-type doped region of the silicon substrate; silicon dioxide formed over an N-type doped region of the silicon substrate; P-type doped polysilicon formed on the silicon nitride; N-type doped polysilicon formed on the silicon dioxide; a positive-type metal contact formed on the P-type doped polysilicon region; and a negative-type metal contact formed on the N-type doped polysilicon region.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] 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.

[0004] Figure 1 illustrates a table of sample dielectric compounds, according to some embodiments.

[0005] Figure 2 illustrates a sample energy level diagram, according to some embodiments.

[0006] Figure 3 illustrates another sample energy level diagram according to some embodiments.

[0007] Figure 4 illustrates still another sample energy level diagram according to some embodiments.

[0008] Figure 5 illustrates a dopant diffusion diagram according to some embodiments.

[0009] Figures 6-8 illustrate cross-sectional views of various example dielectrics, according to some embodiments.

[0010] Figure 9 illustrates a cross-sectional view of an example solar cell, according to some embodiments.