Claims

What is claimed is:

1. A method of fabricating a solar cell, comprising:

providing a wafer as a central substrate;

depositing or growing at least one interface passivation layer over the substrate;

depositing at least one conductive layer over the passivation layer(s);

providing thermal treatment; and

providing metallization as electrodes.

2. The method of claim 1, further comprising depositing at least one antireflective layer, and/or a low reflective index layer forming a good internal mirror on a back of the solar cell.

3. A method of forming a solar cell, comprising applying a heat treatment to produce a multifunctional film which separates into a surface passivating interface layer and a highly doped polycrystalline passivation layer with high transparency.

4. The method of claim 3, wherein the heat treatment results in perforation of the passivation interface layer to thereby allow carrier transport therethrough.

5. A method of forming a solar cell, comprising depositing an amorphous, silicon containing compound and using a heat treatment to initiate crystallization into a polycrystalline film.

6. A method of forming a solar cell, comprising depositing an amorphous, silicon containing compound and using a heat treatment which leads to a crystallization of the film and increases the optical transmissivity.

7. A method of forming a solar cell, comprising depositing an amorphous, silicon containing compound and using a heat treatment to activate doping atoms in the compound.

8. A method of forming a solar cell, comprising depositing an amorphous, silicon containing compound and using a thermal treatment greater than 500°C to activate doping atoms in the compound and result in diffusion of dopant atoms into a substrate to provide a high-low junction or a p-n junction.

9. A solar cell formed according to any of the above methods 1-8.

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What is claimed is:

[Claim 1]

A method of fabricating a solar cell, comprising:

providing a wafer as a central substrate;

depositing or growing at least one interface passivation layer over the substrate;

depositing at least one conductive and passivating layer on the at least one interface passivation layer, the at least one conductive and passivating layer comprising a dopant;

providing thermal treatment at a temperature of 500° C or higher, the thermal treatment crystallizing, at least in part, the at least one conductive and passivating layer to facilitate diffusion of the dopant through the at least one interface passivation layer; and

providing metallization as electrodes over the at least one conductive and passivating layer.

[Claim 2]

The method of claim 1, further comprising depositing at least one antireflective layer and/or a low reflective index layer to form a good internal mirror on a back of the solar cell.

[Claim 3]

The method of claim 1, wherein the depositing or growing the at least one interface passivation layer and the depositing at least one conductive and passivating layer comprises:

depositing an amorphous silicon-containing compound over the substrate and

providing thermal treatment of 500° C or higher to separate the amorphous silicon-containing compound into the at least one interface passivation layer and the at least one conductive and passivating layer.

[Claim 4]

The method of claim 1, wherein the thermal treatment results in perforation of the at least one interface passivation layer to allow carrier transport there-through.

[Claim 5]

The method of claim 1 or 2, wherein the at least one conductive and passivating layer comprises an amorphous silicon-containing compound, and

wherein the thermal treatment initiates crystallization of the at least one conductive and passivating layer into a polycrystalline film.

[Claim 6]

The method of claim 1 or 2, wherein the at least one conductive and passivating layer comprises an amorphous silicon-containing compound, and

wherein the thermal treatment initiates crystallization of the at least one conductive and passivating layer and increases the optical transmissivity.

[Claim 7]

The method of claim 1 or 2, wherein the at least one conductive and passivating layer comprises an amorphous silicon-containing compound, and

wherein the thermal treatment activates doping atoms in the compound.

[Claim 8]

The method of claim 1 or 2, wherein the at least one conductive and passivating layer comprises an amorphous silicon-containing compound, and

the facilitating diffusion of the dopant further comprises facilitating diffusion of the dopant through the at least one interface passivation layer into the substrate provide a high-low junction or a p-n junction.

[Claim 9]

A solar cell formed according to any one of claims 1-8.