CLAIMS

What is claimed is:

1. A solar cell comprising:

a P-type diffusion region and a plurality of N-type diffusion regions, wherein at least one of the P-type diffusion region and N-type diffusion regions comprises a polysilicon diffusion region;

a P-type metal contact that is electrically coupled to the P-type diffusion region;

an N-type metal contact that is electrically coupled to the N-type diffusion regions and is directly over the P-type diffusion region;

a first dielectric layer over the P-type diffusion region and the N-type diffusion regions, the first dielectric layer comprising contact holes that expose the N-type diffusion regions but not the P-type diffusion region, the first dielectric layer being configured to electrically isolate the P-type diffusion region from the N-type metal contact, the N-type metal contact being electrically coupled to the N-type diffusion regions through the contact holes; and

a second dielectric layer that is disposed on the first dielectric layer and between two adjacent contact holes of the first dielectric layer,

wherein the N-type metal contact is disposed on the second dielectric layer.

2. The solar cell of claim 1, wherein the first dielectric layer comprises a silicon nitride.

3. The solar cell of claim 1, wherein the first dielectric layer comprises amorphous silicon.

4. The solar cell of claim 1, wherein the second dielectric layer comprises a transparent material.

5. The solar cell of claim 1, wherein the second dielectric layer comprises a semi-transparent material.

6. The solar cell of claim 1, wherein the second dielectric layer comprises pigmented ink.

7. The solar cell of claim 1, wherein the second dielectric layer comprises polyimide.

8. The solar cell of claim 1, wherein the second dielectric layer has a thickness greater than 500 Angstroms.

9. The solar cell of claim 1, wherein the first and second dielectric layers are configured to have a breakdown voltage greater than 1×107 V/cm.

10. The solar cell of claim 1, wherein the solar cell is a backside contact solar cell.

11. A solar cell comprising:

a plurality of diffusion regions of a first conductivity type and a plurality of diffusion regions of a second conductivity type on a backside of a solar cell, wherein at least one of the diffusion regions of the first conductivity type and the second conductivity type comprises polysilicon;

a first metal contact that is electrically coupled to the diffusion regions of the first conductivity type and is directly over a diffusion region of the plurality of diffusion regions of the second conductivity type;

a second metal contact that is electrically coupled to the diffusion region of the second conductivity type;

a first dielectric layer over the diffusion regions of the first conductivity type and the diffusion region of the second conductivity type, the first dielectric layer comprising contact holes through which the first metal contact electrically couples to the diffusion regions of the first conductivity type, the first dielectric layer being configured to electrically isolate the diffusion region of the second conductivity type from the first metal contact; and

a second dielectric layer disposed on the first dielectric layer, the first metal contact being disposed on the second dielectric layer,

wherein the second dielectric layer is located between two adjacent contact holes of the first dielectric layer.

12. The solar cell of claim 11, wherein the first dielectric layer comprises silicon nitride.

13. The solar cell of claim 11, wherein the first dielectric layer comprises amorphous silicon.

14. The solar cell of claim 11, wherein the second dielectric layer comprises a transparent material.

15. The solar cell of claim 11, wherein the second dielectric layer comprises a semi-transparent material.

16. The solar cell of claim 11, wherein the second dielectric layer comprises pigmented ink.

17. The solar cell of claim 11, wherein the second dielectric layer comprises polyimide.

18. The solar cell of claim 11, wherein the second dielectric layer has a thickness greater than 500 Angstroms.

19. The solar cell of claim 11, wherein the first and second dielectric layers have a breakdown voltage greater than 1×107 V/cm.

20. The solar cell of claim 11, wherein the first conductivity type is N-type and the second conductivity type is P-type.