12. The method of claim 9, wherein forming the silicon layer comprises forming a hydrogenated amorphous silicon layer.

13. The method of claim 12, wherein forming the hydrogenated amorphous silicon layer and forming the carbosilane layer comprise using plasma enhanced chemical vapor deposition (PECVD).

14. The method of claim 9, wherein removing the non-implanted regions of the silicon layer and the non-implanted regions of the carbosilane layer comprises using a hydroxide-based wet etchant to texturize exposed portions of the substrate.

15. The method of claim 9, wherein forming the silicon layer comprises forming the silicon layer on a thin dielectric layer disposed on the substrate, and wherein the substrate is a monocrystalline silicon substrate.

16. The method of claim 9, wherein implanting through the shadow mask comprises implanting through a graphite shadow mask, and wherein the graphite shadow mask is positioned off of, but in close proximity to, the silicon layer.

17. A back contact solar cell, comprising:

a monocrystalline silicon substrate having a light-receiving surface and a back surface;

a thin dielectric layer disposed on the back surface of the monocrystalline silicon substrate;

a polycrystalline silicon emitter region disposed on the thin dielectric layer, the polycrystalline silicon emitter region doped with impurity atoms;

a carbosilane layer disposed on, and aligned with, the polycrystalline silicon emitter region; and

a conductive contact structure disposed through the carbosilane layer and on the polycrystalline silicon emitter region.

18. The back contact solar cell of claim 17, wherein the carbosilane layer is also doped with the impurity atoms.