substrate **10**, the second dopant **302** and the second counter dopant **304** are activated, and the back surface field layer **30** is formed from the layer **301**.

Since the second dopant **302** and the second counter dopant **304** are activated in the same heat-treatment process, the doping concentration is generally lowered. Specifically, the doping concentration at the surface can be largely reduced. Here, when the second dopant **302** and the second counter dopant **304** are heat-treated for the activation, in the doping profile, the doping concentration is gradually lowered from the surface of the semiconductor substrate **10** and toward the inside of the back surface field layer **30**.

In the above embodiment, the emitter layer **20** and the back surface field layer **30** are formed by the ion-implantation method. However, the invention is not limited thereto. Thus, the emitter layer **20** and the back surface field layer **30** may be formed by one or more of various methods. That is, the doping methods of the first dopant **202** and the first counter dopant **204** may be different, and/or the doping methods of the second dopant **302** and the second counter dopant **304** may be different. For example, the first or second dopant **202** or **302** may be doped by the ion-implantation method, and the first or second counter dopant **204** or **304** may be doped by the thermal diffusion method. Selectively, the first or second dopant **204** or **304** may be doped by the thermal diffusion method, and the first or second counter dopant **204** or **304** may be doped by the ion-implantation method. Various other modifications are possible.

Also, in the above embodiment, the heat-treatment for activating the emitter layer **20** and the heat-treatment for activating back surface field layer **30** are separately performed. However, the invention is not limited thereto. Thus, after the first dopant **202** and the first counter dopant **204** for the emitter layer **20** and the second dopant **302** and the second counter dopant **304** for the back surface field layer **30** are doped, the heat-treatment for activating them may be performed at the same time.

In addition, in the above embodiment, after the first dopant **202** and the first counter dopant **204** for the emitter layer **20** are doped, the second dopant **302** and the second counter dopant **304** for the back surface field layer **30** are doped. However, the invention is not limited thereto. Thus, the doping sequence of the first dopant **202**, the first counter dopant **204**, the second dopant **302**, and the second counter dopant **304** may be changed.

Next, as shown in FIG. **3***f*, an anti-reflection layer **22** and a passivation layer **32** are formed on the front and back surfaces of the semiconductor substrate **10**, respectively. The anti-reflection film **22** and the passivation layer **32** may be formed by one or more of various methods such as a vacuum evaporation method, a chemical vapor deposition method, a spin coating method, a screen printing method, or a spray coating method.

Next, as shown in FIG. **3***g*, the first electrode **24** electrically connected to the emitter layer **20** is formed at the front surface of the semiconductor substrate **10** and the second electrode **34** electrically connected to the back surface field layer **30** is formed at the back surface of the semiconductor substrate **10**.

After forming an opening **26** at the anti-reflection layer **22**, the first electrode **24** may be formed inside the opening **26** by one or more of various methods, such as a plating method or a deposition method. Also, after forming an opening **36** at the second passivation layer **32**, the second electrode **34** may be formed inside the opening **36** by one or more of various methods, such as a plating method or a deposition method.

Selectively, the first and second electrodes **24** and **34** may be formed by fire-through or laser firing contact of printed pastes for the first and second electrodes **24** and **34**. For example, the pastes may be printed by various methods such as a screen printing method. In this case, because the openings **26** and **36** are naturally formed during the fire-through or the laser firing contact, the steps for forming the openings **26** and **36** are not necessary.

Likewise, the emitter layer **20** includes the first dopant **202** and the first counter dopant **204**, and thus, a sufficient junction depth can be achieved and the surface concentration at the emitter layer **20** can be reduced. Also, the back surface field layer **30** includes the second dopant **302** and the second counter dopant **304**, and thus, the back surface field layer **30** can have a sufficient thickness and the surface concentration at the back surface field layer **30** can be reduced. Accordingly, the surface recombination at the front and back surface of the semiconductor substrate **10**, and the efficiency of the solar cell **100** can be enhanced.

Hereinafter, a solar cell including a dopant layer according to other embodiments and a method for the solar cell will be described in detail. In the following description, the described portions in the above may be omitted, and the not-described portions in the above will be described in detail. Also, the modifications in the above embodiments can be applied to the following embodiments.

FIG. **4** is a cross-sectional view of a solar cell according to another embodiment of the present invention.

Referring to FIG. **4**, in the solar cell according to the embodiment, an emitter layer **20** as a first dopant layer has a selective emitter structure, and a back surface field layer **30** as a second first dopant layer has a selective back surface field structure.

Particularly, the emitter layer **20** may include a first portion **20***a* formed adjacent to and in contact with the first electrode **24**, and a second portion **20***b* other than the first portion **20***a*.

The first portion **20***a* has a doping concentration of the first dopant **202** higher than that at the second portion **20***b*, and thus, the first portion **20***a* has a resistance lower than that of the second portion **20***b*. Then, a shallow emitter can be achieved at the second portion **20***b* where the sun light is incident between the first electrodes **24**, and thereby enhancing the current density of the solar cell. In addition, contact resistance with the first electrode **24** can be reduced by forming the first portion **20***a* with a relatively low resistance at a portion being in contact with the first electrode **24**. That is, when the emitter layer **20** has the selective emitter structure, the efficiency of the solar cell can be maximized.

For the above, a doping amount of the first dopant **202** at the first portion **20***a* is larger than that at the second portion **20***b*. In order to differentiate the doping amount at the first portion **20***a* and the second portion **20***b*, a comb mask may be used. However, the invention is not limited thereto. Thus, a number of doping processes to the first portion **20***a* may be more than a number of doping processes to the second portion **20***b*. That is, various methods may be used for forming the selective structure.

Here, in the embodiment, the first counter dopant **204** is entirely doped to the semiconductor substrate **10** with a uniform doping amount.

Also, the back surface field layer **30** may include a first portion **30***a* formed adjacent to and in contact with the second electrodes **34**, and a second portion **30***b* other than the first portion **30***a*.

The first portion **30***a* has a doping concentration of the second dopant **302** higher than that at the second portion **30***b*, and thus, the first portion **30***a* has a resistance lower than that of the second portion **30***b*. Then, the recombination of the electrons and the holes can be prevented by forming the