μm, with a substantial thickness variation. The electrode resistance thus increases, becoming a deleterious factor against an improvement in conversion efficiency.

[0003]

For the purpose of reducing the resistance value of a collector electrode, a method of forming a collector electrode by repeating screen printing plural times and using a mesh screen of different pattern in each of plural screen printing steps is under study (see, for example, JP-A 2010-103572). The solar cell manufactured by such a method generally has the structure shown in FIG. 2. As a result of overlay printing, the front electrode has an increased height. In FIG. 2, the front electrode includes a second layer 7.

[0004]

However, if the mesh screens have different patterns, with which the degree of spreading under a printing pressure applied differs, the precision of printing is adversely affected. It is difficult to overlay collector electrode layers accurately. A misregistration occurs between collector electrode layers, resulting in a solar cell with low conversion efficiency or an appearance problem due to local thickening of collector electrode.

SUMMARY OF INVENTION

Technical Problem

[0005]

Embodiments of~~While~~ the invention ~~is made under the above circumstances,~~ seek~~its object is~~ to provide a solar cell and manufacturing method, which can form a collector electrode by precision printing, can reduce its resistance value, can improve electrical properties, and can reduce the takt time of manufacture.

Solution to Problem

[0006]

Making extensive investigations to attain the above object, the inventors have found that when a collector electrode is formed by repeating screen printing plural times,

the resistance value of the collector electrode can be reduced by setting such that the squeegee speed during second and later screen printing steps is equal to or higher than the squeegee speed during first screen printing step. This may prevents any misregistration between collector electrode layers due to a change of the mesh screen pattern and may enables reduction of the takt time. It is advantageous for the fabrication of solar cells that the collector electrode may beis formed by the screen printing process that may enables to reduce the takt time without detracting from reliability and outer appearance. The invention is predicated on this finding.

[0007]

According~~ly,~~ to an aspect of the present invention, there is provide~~s~~d a method for manufacturing a solar cell having a collector electrode, characterized in that the collector electrode is formed by screen printing of a conductive paste containing a metal, glass frit and varnish at a collector electrode-forming site, and the screen-printing step is repeated plural times in an overlapping manner, wherein the squeegee speed during the second and later screen printing steps is equal to or higher than the squeegee speed during the first screen printing step; and a solar cell manufactured by the method.

In a preferred embodiment, the value obtained by subtracting the squeegee speed during the first screen printing step from the squeegee speed during the second and later screen printing steps is 0 mm/sec to 300 mm/sec.

Advantageous Effects of Invention

[0008]

In the method for manufacturing a solar cell by screen printing a collector electrode according to embodiments of the invention, second and later collector electrode printing steps are carried out at a speed equal to or higher than the speed of first collector electrode printing step, whereby electrical properties of the solar cell can be improved without detracting from reliability and outer appearance, and the takt time for solar cell manufacture can be reduced. The