Description

Method for texturing silicon wafers, treatment liquid therefor, and use

Field of application and prior art

The invention relates to a method for treating silicon wafers in the production of solar cells according to the generic clause of claim 1 and to a treatment liquid suitable for this purpose. Furthermore, the invention relates to the use of a treatment liquid of the invention for carrying out said method.

For example, DE 102007026081 A1 discloses the texturization of silicon wafers in the production of solar cells. For this purpose, a treatment liquid is applied to the wafer surface, by which means pyramidal protrusions are formed on the silicon surface. These improve the coupling of light into the silicon wafer and subsequently into the solar cell with concomitant improvement of their energy yield. The treatment liquid can contain isopropanol as added etch inhibitor.

Object and its achievement

It is an object of the invention to provide a method as stated above and also a treatment liquid suitable for this purpose, by means of which problems encountered with the prior art can be obviated and, in particular, quicker and better treatment, i.e. texturization, can be achieved.

This object is achieved by a method having the features defined in Claim 1, a treatment liquid having the features defined in Claim 5, and the use having the features defined in Claim 8. Advantageous and preferred embodiments of the invention are subject matter of the other claims and are explained below in greater detail. The wording of the claims refers expressly to the contents of the description.

The treatment liquid, which is advantageously an alkaline treatment liquid, contains an additive. This additive can be an added etch inhibitor and is according to the invention an ethyl hexanol or cyclohexanol. The two additives can advantageously be used as mutual alternatives, but in some circumstances they

can be used both together. The advantage of these specific additives in the treatment liquid resides in the fact, that by reason of their higher boiling points, it will be possible, in a further embodiment of the invention, to carry out the method at a higher temperature than otherwise possible.

By reason of the fact that the boiling point of ethyl hexanol is 182 °C and that of cyclohexanol is 161 °C, it is clearly possible for the treatment liquid mixed therewith to be used at a higher temperature when carrying out texturization. On account of the low boiling point of 82 °C of the prior additive isopropanol, it requires either constant replenishment, in order not to obtain unsatisfactory texturization results, or the temperature has had to be kept at 80 °C or even lower, in which case the procedure involved for effecting treatment, i.e. the texturization, takes considerably longer, which may also be regarded as being highly detrimental. Usng the additives of the invention, it is thus possible to effect texturization at 80 °C or higher, for example at approximately 90 °C. The duration of treatment can then be from 10 to 15 minutes and advantageously approximately 11 minutes. The silicon wafers can then be removed from a bath containing the treatment liquid and subsequently rinsed and dried and processed further.

In another embodiment of the invention, the silicon wafer can be agitated in the treatment liquid, which likewise improves or accelerates texturization. Provision may also be made in this case for relative movement to take place between the silicon wafer and the treatment liquid , that is to say, for the treatment liquid to be kept in motion or to exhibit an internal fluid current.

The object of the invention is further achieved by the use of the method of the invention, more particularly for effecting treatment of silicon wafers in the production of solar cells.

The treatment liquid of the invention can contain water as a further component in addition to the additive in the form of ethyl hexanol or cyclohexanol. An additive can be added in an amount of from 0.3 % to 4 %, by weight, and particularly advantageously in an amount of from 0.5 to 3%, by weight.

In yet another embodiment of the invention, the treatment liquid can additionally contain KOH. The proportion thereof can be from 1.5 % to 5 %, by volume, and advantageously from 2 % to 3 %, by volume.

Another independent aspect of the invention is the use of a treatment liquid of the invention for the execution of a method, more particularly for execution of a method such as is described above.

These and other features are disclosed in the claims, wherein the individual features can be achieved singly or multiply in the form of subcombinations in any one embodiment of the invention and in other fields and can intrinsically form advantageous and patentable embodiments, for which protection is herein claimed.

As regards the execution of the process of the invention, reference is likewise made to DE 102007026081 A1, the relevant subject matter of which is included in the present description by reference. In said citation, Figs. 1 and 2 illustrate how such a method can be carried out, and it can accordingly be equally well carried out with the process parameters and quantities stated herein.

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Claims

1. A method for the treatment of silicon wafers for the production of solar cells, wherein a treatment liquid is applied to the surface of the silicon wafers for the purpose of texturization thereof, which treatment liquid contains an additive, characterized in that the treatment liquid contains ethyl hexanol or cyclohexanol as additive.

2. The method according to claim 1, characterized in that said method is carried out at a higher temperature than conventional methods for texturization of silicon wafers in the production of solar cells, which higher temperature ranges from 80 ℃ to 95 ℃, and is more particularly approximately 90 ℃.

3. The method according to claim 1 or claim 2, characterized in that said treatment liquid is applied to the silicon wafer for a period ranging from 8 minutes to 20 minutes, more particularly for a period ranging from 10 minutes to 13 minutes.

4. The process according to any one of the previous claims, characterized in that said silicon wafer is agitated in the treatment liquid, i.e., is moved relatively thereto.

5. A treatment liquid for carrying out the method as defined in any one of the previous claims, characterized in that it contains, in addition to water, ethyl hexanol or cyclohexanol as additive.

6. The treatment liquid as defined in claim 5, characterized in that said additive is added in an amount ranging from 0.3 % to 4 %, by weight, and preferably from 0.5 % to 3 %, by weight.

7. The treatment liquid as defined in claim 5 or claim 6, characterized in that it additionally contains KOH, preferably in an amount of from 1.5 % to 5 %, by volume, and more particularly from 2 % to 3 %, by volume.

8. The use of a treatment liquid as defined in any one of claims 5 to 7 for carrying out the method as defined in any one of claims 1 to 4.

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