Method of Cutting an Ingot for Solar Cell Fabrication

TECHNICAL FIELD

[0001] Embodiments of the present invention are in the field of renewable energy and, in particular, methods of cutting ingots for solar cell fabrication.

BACKGROUND

[0002] Ingot slicing, such as silicon ingot slicing, into wafers typically involves using a rectangular beam piece epoxy glued to the ingot. A wire saw work piece is used to hold the beam during the slicing process. Upon completion of slicing, e.g., with a multi-wire web having completely sliced through the ingot and into the beam, a clean separation of the formed wafers must be performed. The separation from the beam must be made with care in order to preserve the final edge of the formed wafers. Following wireweb slicing, the sliced ingot is often loaded into a debond and precleaner tool and undergoes pre-cleaning followed by the epoxy degluing process. Beams used are typically composed of glass for the slurry slicing, or graphite or resin materials for diamond-wire slicing.

SUMMARY

[0002a] According to a first aspect of the invention, there is provided a method of cutting an ingot, the method comprising: gripping a portion of the ingot directly with a gripper of a cutting apparatus; partially cutting the ingot to form a plurality of wafer portions projecting from an uncut portion of the ingot; and further cutting the ingot to separate the plurality of wafer portions from the uncut portion, providing a plurality of discrete wafers.

[0002b] According to a second aspect of the invention, there is provided an ingot for fabricating a plurality of solar cells, the ingot comprising: four major surfaces oriented along a central axis of the ingot, the first major surface different from two or more of the remaining three major surfaces; and a pair of ends approximately orthogonal to the four major surfaces.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Figure 1 is a flowchart representing operations in a method of cutting an ingot for solar cell fabrication, in accordance with an embodiment of the present invention.

[0004] Figure 2A illustrates an operation in a method of cutting an ingot for solar cell fabrication, corresponding to operation 102 of the flowchart of Figure 1, in accordance with an embodiment of the present invention.

[0005] Figure 2B illustrates an operation in a method of cutting an ingot for solar cell fabrication, corresponding to operation 104 of the flowchart of Figure 1, in accordance with an embodiment of the present invention.

[0006] Figure 2C illustrates an operation in a method of cutting an ingot for solar cell fabrication, corresponding to operation 106 of the flowchart of Figure 1, in accordance with an embodiment of the present invention.

[0007] Figure 3 illustrates an end view of a mono-crystalline silicon ingot, in accordance with an embodiment of the present invention.