Solar Cell Laser Grooving

Can laser grooved buried contact improve the performance of silicon solar cells?
Improvementsin the performance of silicon solar cells based on a novel,laser grooved,buried contact approach are described. Independently confirmed energy co

Are laser-doped and grooved contacts better than screen-printed solar cells?
It is observed that the adhesion strength of laser-doped and grooved contacts is more than twice that of the laser doped (LDSE) cell and is slightly superiorto the screen printed metal contact. This finding also supports the superior durability of BCSC compared to screen-printed solar cells reported elsewhere .

How does laser grooving work?
The narrow width and corresponding steep walls of the grooves make it possible to deposit the antireflection coating after the laser grooving process such that the groove walls remain uncoated to allow direct nucleation of subsequent metal plating.

What is laser doping with grooving?
This work introduces a new concept of laser doping with grooving to form narrow grooves with heavily doped walls in a simultaneous step,with the self-aligned metal contact subsequently formed by plating. This process capitalizes on the benefits of both BCSC and LDSE cells.

Why is laser grooving important?
Not only does the laser doping and grooving process minimize laser-induced defects,it also defines the position for subsequent plated metal deposition. Since the top surface of the wafer is coated by SiN x,the exposed heavily doped groove walls define the plating nucleation location and hence the metal contact location.

Can laser scribing be used to make solar cells?
Laser processing has a long history in the manufacturing of solar cells since most thin-film photovoltaic modules have been manufactured using laser scribing for more than thirty years.

2 ???· Laser-doped selective emitter diffusion has become a mainstream technique in solar cell manufacturing because of its superiority over conventional high-temperature annealing. In this work, a boron-doped selective emitter is ...

Laser processing has a long history in the manufacturing of solar cells since most thin-film photovoltaic modules have been manufactured using laser scribing for more than thirty years. Lasers have also been used by many solar cell manufacturers for a variety of applications such as edge isolation, identification marking, laser grooving for selective emitters ...

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Recent studies show that plated contacts based on the latter can be more durable than screen-printed contacts. This work introduces a new concept of laser doping with ...

Laser Processing in Industrial Solar Module Manufacturing Heather BOOTH Oerlikon Solar Ltd, Trubbach, Hauptstrasse 1a, 9477 Trubbach, Switzerland E-mail: heather.booth@oerlikon The use of lasers in the processing of solar cell structures has been known for many years both for c-Si and thin-film solar technologies. The maturity of the laser ...

Grooved solar cells are manufactured by scribing the surface of the substrate with a laser scribing tool, and optionally etching the surface to more accurately determine the surface profile, before performing the remainder of the processing steps involved in the production of the solar cell. Top contact shading is avoided by providing holes through the substrate which allow connection to ...

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In this work, laser illumination and temperature are used to control the position of the Fermi level [38], and therefore also the relative concentrations of hydrogen charge states, to passivate laser damage in LDG lifetime test structures and finished solar cells. 2. The laser doping and grooving process

This study presents an innovative approach to mitigate the cost of solar devices by employing luminescent solar concentrators (LSCs) that act as waveguides to direct sunlight toward photovoltaic (PV) cells. LSCs, while effective, face challenges such as escape cones and reabsorption losses during light concentration. To address these ...

Improvements in the performance of silicon solar cells based on a novel, laser grooved, buried contact approach are described. Independently confirmed energy conversion efficiencies as high as 19.8% are reported for cells of 12 cm 2 area, as are the resistivity dependence of efficiency, spectral response data, and the results of ...

This laser doping and grooving (LDG) approach capitalizes on the benefits of the BCSC, the high aspect ratio metallization, low shading loss, and strong metal adhesion strength, but with the simplicity of the LDSE solar cell processing sequence. The approach consists of a modified laser doping process in which narrow grooves with ...

Metallization plays both optical and electrical roles in the performance of a solar cell. Optically, the gridline width contributes to shading, which impacts the short circuit current.

This article introduces two different approaches for passivating the laser separated PERC solar cells. The first method is "Laser scribing and simultaneous Al doping". ...

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This article introduces two different approaches for passivating the laser separated PERC solar cells. The first method is "Laser scribing and simultaneous Al doping". The method uses two steps for scribing. The first scribe melts the aluminium while the second scribe follows the standard recipe for cutting. Different variations ...

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Scientists at Fraunhofer ISE have demonstrated high efficiency silicon solar cells (21.7%) by using laser firing to form passivated rear point contacts in p-type silicon wafers.

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