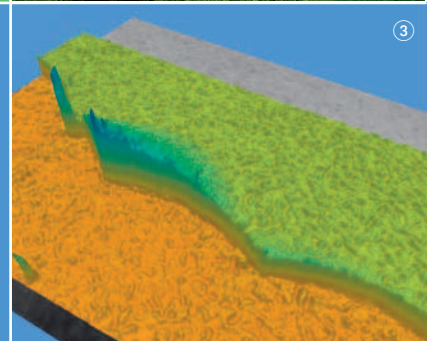
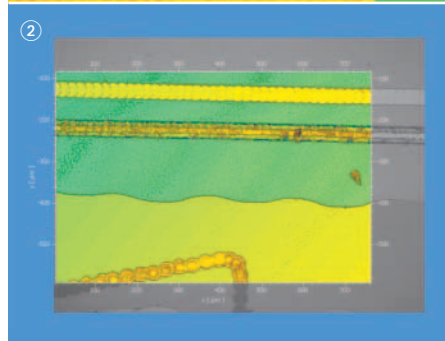
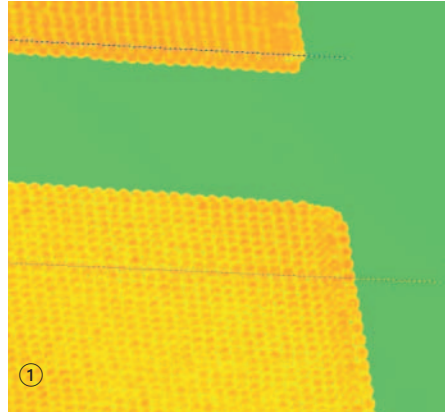


Low-Cost Energy Sources

Optical Surface Metrology for Laser Structuring of Thin-Film Solar Cells

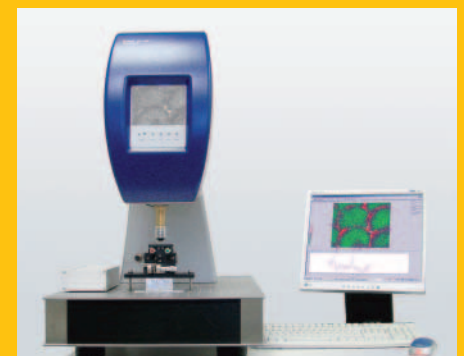
The photovoltaic solar cell industry is experiencing enormous growth. However, in order to lower the costs per generated kWh of electricity, new technologies must be exploited as well as cost-efficient manufacturing processes. Current thin-film solar cells are based on a thin silicon layer and can be economically produced. Laser technology offers many opportunities for special processing of the solar cells. Laser structuring (or micro-machining) can be used to remove parts of the silicon layer in order to create a serial connection of single cells within a module. Furthermore, the laser can help to electrically insulate the rims of the module. The images show some examples of the topography of such laser processed cells, from large-scale silicon removal (Fig. 1) to the analysis of the erosion caused by a single laser pulse. The measurements were taken with a Polytec TMS-1200 TopMap μ .Lab topography measurement system. A short measurement time of a few seconds was used. In Fig. 2 several line structures are shown which were created by different



lasers and feed rates. In Fig. 3, the edge of a laser-created erosion structure is shown in a 3-D view showing some ejected material. We wish to thank the LZH Laser Zentrum Hannover e.V. for the laser structuring of the solar cells.

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Polytec Product Info

TopMap μ .Lab Topography Measurement System

The TMS-1200 TopMap μ .Lab sets the benchmark for microscope-based, high-precision, non-contact topography measurement with high spatial resolution. It is suitable for research & development applications and for failure analysis. Integration of the μ .Lab into commercial probe stations is easy and straight forward. Customized software is included that allows for rapid routine testing.

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