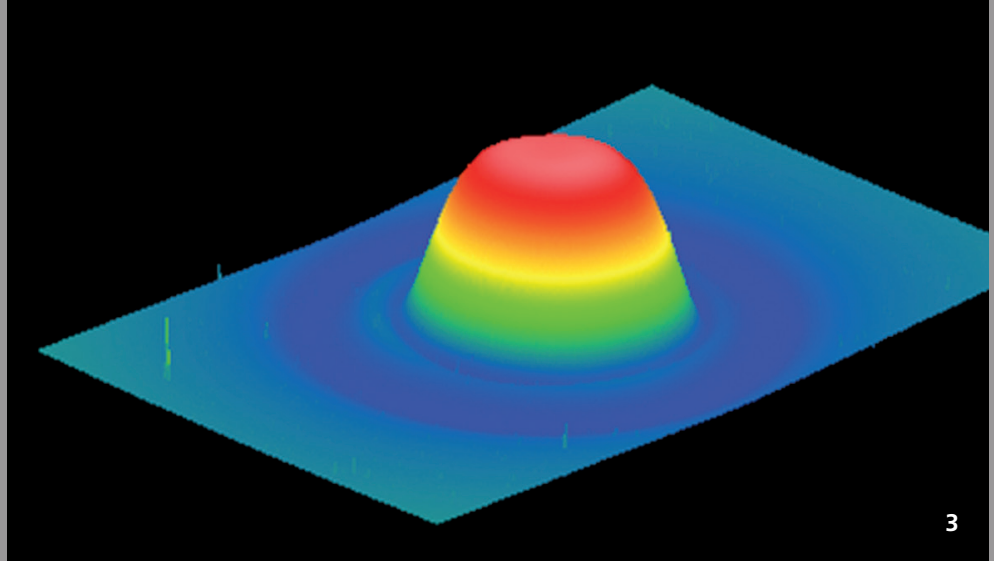

GLASS-BUMP SPACERS MADE FOR VACUUM-INSULATED GLASS WITH LASER REMELT STRUCTURING

Task

Vacuum-insulated glass offers new opportunities for energy-efficient facade design since the overall window thickness can be significantly reduced. In particular, vacuum insulated glass panes can replace single glazed windows in older buildings and, therefore, reduce heat loss. The individual glass panes in vacuum-insulated glass are currently separated from each other by metallic spacers. However, these are visible and require a complex installation process. These metallic spacers should be replaced by glass-bump spacers structured with laser radiation directly from the surface of the pane itself.

Method

CO_2 laser radiation can be used to heat the surface of float glass locally. With sufficient interaction time and intensity, a melt bath is produced on the surface. Thanks to melting movement, the material is redistributed in such a way that a glass-bump spacer is generated out of the rapid solidification.

Result

Structuring by laser remelting was used to generate glass-bump spacers with a height of up to 50 µm and a width of 1 - 2 mm on float glass. By varying the process parameters such as laser power or interaction time, Fraunhofer ILT can customize the height and shape of the glass-bump spacers.

The process time is less than 500 ms per glass-bump spacer. The total process time to generate several glass-bump spacers is further reduced by parallelization, in which many glass-bump spacers are generated simultaneously. The current work is focused on reducing the width of the glass-bump spacers, so as to further reduce their visibility.

Applications

The glass-bump spacers are to be used, after their visibility has been reduced further, on glass surfaces as spacers in vacuum-insulated glass panes. Thus, they can replace the visible metallic supports. The manufacturing process of vacuum-insulated glass can be significantly shortened when the process of structuring by remelting is integrated into the manufacturing process of float glass.

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Contact

M.Sc. Christian Weingarten
Telephone +49 241 8906-282
christian.weingarten@ilt.fraunhofer.de

3 White-light interferometric image of a glass-bump spacer (height about 25 µm, width about 2 mm).