



Advances in OptoElectronics

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Research Article

Analysis of the Optical Properties of Screen-Printed and Aerosol-Printed and Plated Fingers of Silicon Solar Cells

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Abstract

One main efficiency loss in industrial solar cells is the shading of the cell caused by the metal front side contacts. With the aerosol-printing technique plus an additional light-induced plating (LIP) step, not only is the geometrical contact width narrowed compared to screen-printed contacts but also the shape of the finger changes. In this work, the effective shading of different finger types is analysed with two different measurement methods. The essential parameter for characterising the finger is the effective width which can be reduced drastically compared to the geometrical width due to total internal reflection at the glass-air layer and the reflection from the roundish edges of the contact fingers into the cell. This parameter was determined with different methods. It could be shown that for aerosol-printed fingers the effective (optical) width is only 38% of its geometrical width, while for standard screen-printed fingers it is 47%. The measured values are compared to a theoretical model for an aerosol-printed and plated finger and are in good agreement.

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