

## White Building-Integrated Photovoltaics by Micron Textured Structure

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Building-integrated photovoltaics (BIPV) are solar panels integrated into building facades, serving a dual purpose of generating renewable energy and enhancing aesthetic appeal.[1] Conventional solar cells, typically dark color, are often considered unaesthetic for architectural applications. To address this, white-colored BIPV have been developed. However, achieving a white appearance reduces light transmission and decreased conversion efficiency, as light is reflected rather than absorbed. Existing methods, such as adding optical films or mineral materials, can produce a whiter color but significantly reduce conversion efficiency.[2] Sandblasting the glass surface creates a textured layer that scatters incident light. By adjusting the grain size of the sand, textured glass with varying surface roughness can be fabricated.[3] Textured structure alters the angle of incident light, increasing the light path length within the solar cells. This study aims to use textured glass to achieve a white BIPV appearance while maintaining high conversion efficiency.

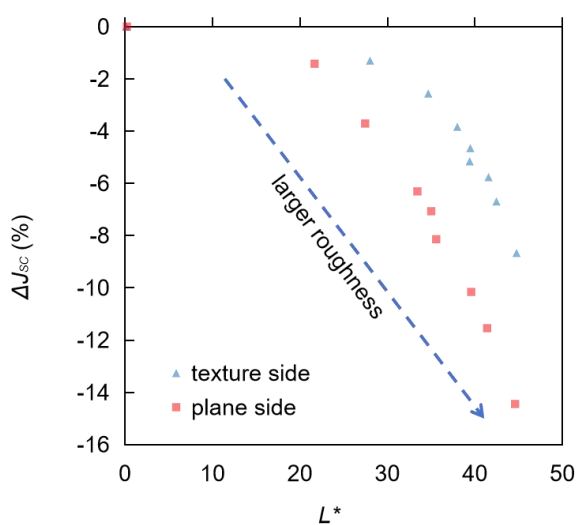


Figure 1. Relationship between  $L^*$  and  $\Delta J_{sc}$ .

maintaining a conversion efficiency exceeding 90%.

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### Reference:

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5 cm × 5 cm × 1 mm textured glass sheets were prepared by sandblasting different size of sand grids. Roughness (RMS) was assessed by Dektak analysis. Luminosity ( $L^*$ ) and chroma ( $C^*$ ) values evaluated the brightness of the PV modules. Short circuit current density loss ( $\Delta J_{sc}$ ) evaluated the solar cell conversion efficiency under AM 1.5G illumination. Figure 1 depicts the relationship between  $L^*$  and  $\Delta J_{sc}$ . Means larger surface roughness makes larger luminosity, while reduce some conversion efficiency. Additionally, when light incidents at the textured surface, PV module can achieve 45 luminosity while