

## Enhancement of Light-Harvesting and Self-Cleaning Effects Using Moth-Eye Nanopattern

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Moth-eye-inspired structures were fabricated on the outer surface of the photoanode of DSSCs using a facile SNIL process. Commercially available perfluoropolyether (PFPE) and NOA63 as the mold resin and second replica mold material, respectively, play an important role in fabricating the structure. Polyurethane-based NOA63 was shown to create a well-ordered moth-eye structure that exhibits increased transmittance (82% at 540nm), which was consistent with the IPCE data (81% at 540nm). As a result, ssDSSCs with the moth-eye structure showed enhancements of 10.7% ( $J_{sc}$ ) and 9.8% ( $\eta$ ) to reach 7.3% efficiency at  $100 \text{ mW cm}^{-2}$ , one of the highest values observed for N719 dye based ssDSSCs. Furthermore, they showed excellent superhydrophobicity of about  $150^\circ$ , even without the aid of a fluorinated self-assembled monolayer (SAM) coating. This nature-inspired nanopatterning process could be used for improving light harvesting in any type of photovoltaic cell, and it produces superhydrophobic surfaces, which in turn lead to self-cleaning for long-term stability.