

## Modelling of Silicon Solar Cell with Anti-reflecting Coating

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**Abstract :** In this study, a silicon solar cell has been modeled and analyzed to enhance its electrical performance by improving the optical properties using an antireflecting coating (ARC). The dynamic optical reflectance, transmittance along with the net transmissivity absorptivity product of each layer are assessed as per the diurnal variation of the angle of incidence using MATLAB 2019. The model is tested with various Anti-Reflective coatings and the performance has also been compared with uncoated cells. ARC improves the optical transmittance of the photon. Higher transmittance of  $\sim 96.57\%$  with lowest reflectance of  $\sim 1.74\%$  at 12.00 hours was obtained with  $\text{MgF}_2$  coated silicon cells. The electrical efficiency of the configured solar cell was evaluated for a composite climate of New Delhi, India, for all weather conditions. The annual electricity generation for Anti-reflective coated and uncoated crystalline silicon PV Module was observed to be 103.14 KWh and 99.51 KWh, respectively.

**Keywords :** antireflecting coating, electrical efficiency, reflectance, solar cell, transmittance

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