ABSTRACT

This study evaluates the performance of solar photovoltaic (PV) panels with varying anti-reflective coating (ARC) thicknesses using silicon dioxide (SiO_2) and magnesium oxide (MgO) by spray coating, alongside a non-coated PV panel. Three PV panels are used in this project, First one is coated with SiO_2 then readings were observed . Second one is coated with MgO then readings were observed. Last one is an uncoated PV panel then readings were observed. After single coating is done ,Second coating is done on the first PV panel with same SiO_2 by varying the thickness of coating then readings were observed. Similarly, Second coating is done on the second PV panel with same MgO by varying the thickness of coating then readings were observed. One week observations are done on the three PV panels by various analysis. The performance analysis measures voltage, current, and efficiency of each panel under varying solar radiation conditions. Further investigation includes Scanning electron microscopic (SEM) and Elemental (EDAX) analysis of SiO_2 and MgO coatings to understand their microstructure and elemental composition, providing insights into their effectiveness as anti-reflective coatings. SiO_2 coated panels are 1.20% more efficient than MgO coated panels and 3.29% more efficient than non-coated. By comparing the performance analysis such as efficiency of panels with different coatings, the study concludes that SiO_2 coating is the most suitable option for enhancing the efficiency of solar PV panels.