Study the Effect of a Single Layer of Anti-reflective Coating (Ge) on the Quantitative Efficiency of a Silicon Solar Cell

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Abstract

The objective of this research is to study the possibility of reducing the reflectivity of the front surface of a silicon cell (Si / Si) by using a theoretical design for a single-layer Antireflection Coatings with a thickness of one quarter of the design wavelength. Then, Mathematical programs in MATLAB (10) were designed to study the quantitative efficiency of the cell as a function of the change in the particle size of the coating within the range (400 - 700 nm) wavelength of the visible state of the vertical and oblique state at the (45°) angle. (Ge) was used as an anti-reflective material. It was found that the highest quantitative efficiency was (96.9004%) at design wavelength (λ0= 550 nm) in the case of vertical fall. Whereas, in the case of a sloping fall at an angle of (45o), a quantitative efficiency of (94.0545%) at vertical polarization (S). In the case of horizontal polarization (P), the quantitative efficiency value is (96.3131%) when the particle size of the coating is (Ps = 4.4nm).