Simulation and Optimization of Coating thickness for Absorptance and Reflectance in Multilayered Thin Films

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Abstract : Solar selective materials and structure of solar thermal energy conversion systems plays a prominent role for the improvement of optical properties. In the present work simulations on multi-layered thin films have been conducted using code software with Mo and Was functional layer in combination with bond layer and protective layers of Si_3N_4 and Al_2O_3. The better combination is selected for optimization on thickness for absorption and reflection. To simplify experimentation, Taguchi's design of experiments approach was adopted to determine the optimum material layer combination.The results indicate for multi-layered thin films that combination of Al_2O_3-Mo-Al_2O_3 has better reflectance of 50.48% and combination Si_3N_4-W-Si_3N_4 has better absorptance of 74.81% upon optimization on thickness of bond layers, functional and protective layers. These results are discussed on main effect plots, contour plots and surface plots.

Keywords : Absorptance, Optimization, Reflectance,Thin film.

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