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Optical properties of Mo-SiC thin film composites

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Abstract content
   (Max 300 words)

Owing to its high thermal stability and hardness as well as chemical inertness, Silicon Carbide (SiC) when doped with an appropriate metal might be a suitable candidate as high temperature solar absorber. Using literature optical constants of SiC and Mo, simulations of optical reflectance of Mo-SiC thin films composite showed a solar absorbance of 0.9 and an emissivity of 0.05 with a merit factor of 0.89 when the films are in tandem structure and capped with an Al2O3 antireflection layer. This is in favor of Mo-SiC as a potential solar absorber. In a preliminary experimental study with the aim of extracting SiC optical constants, Mo-SiC composite films with different composition and SiC thin films were deposited at room temperature on soda lime glasses by RF sputtering. XRD investigation revealed that SiC films were amorphous and Mo exhibited nano-crystalline structure in Mo-SiC films. From the optical transmittance, carried out in Cary 400 spectrophotometer in the UV-ViS range, the optical constants of amorphous SiC films were extracted using a modified Lorentz dielectric function. To predict the composition of the Mo-SiC composite we used the effective medium theory in conjunction with the extracted optical constants of amorphous SiC to obtain the filling factor. The values of filling factor were in very good agreement with the ones obtained from EDS when the Bruggeman effective medium theory is used.

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