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STRUCTURAL AND OPTICAL PROPERTIES OF ZrO2/Zr/ZrO2 MULTILAYERED SELECTIVE SOLAR ABSORBER

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Selective solar absorber coatings based on ZrO2/Zr/ZrO2 multilayered coatings were prepared using Dc magnetron sputtering machine onto microscopic glass, silicon wafers and copper substrates. It was found that ZrO2/Zr/ZrO2 multilayered solar absorber coating exhibited a good spectral selectivity of 0.90/ 0.12. The chemical composition and structures were investigated by scanning electron microscop (SEM), x-ray diffraction (XRD) and atomic force microscopy (AFM). The spectral reflectance of the as- deposited coatings were measured by UV-vis-NIR spectrophotometer, 0.25-2.5µm, and thermal emittance spectra were also measured by emmisometer. The multilayered selective solar absorber coatings shows a good prospects for solar absorber because of simple process, low cost, large area and good performance.

Summary

In this work, the synthesis of the thin films will be done using DC Magnetron sputtering system, because of its high deposition rates, ease of sputtering any metal, high purity film and excellent uniformly on large-area substrates. Zr metallic layer will be deposited onto microscopic glass, Si wafers and Cu substrates.Then ZrO2 layer on top of Zr like making a sandwich. And then another Zr onto ZrO2 layer. Finally ZrO2 will be deposited to complete a multilayered selective solar absorber, hence SiO2 will also be deposited as optional to avoid oxidation. The samples will be characterized using various characterization techniques such as XRD, SEM, EDS, AFM, UV-Vis-NIR spectrophotometer and emissometer.

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Main supervisor (name and email)
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