Ag-ZrO2 cermet coatings sprayed onto steel sheet

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Abstract

A new pathway is proposed to produce solar selective cermet coatings on the base of silver nanoparticles embedded in amorphous zirconia deposited onto aluminized steel sheet (AS) by chemical spray pyrolysis. We show that silver nanoparticles can be obtained by a simple and cheap air pressure spray technique when using mixed (Ag + Zr) precursor solutions. Silver particles are metallic as shown in an XPS study [1]. Here various Ag-ZrO_2 multilayer coating systems were studied with respect to their solar selective properties (UV-VIS-IR) in relation to layer structure (SEM/FIB; TEM/EDS) and silver nanoparticle size distribution (AFM).

References

[1] R. Romero, F. Martin, J.R. Ramos-Barrado, D. Leinen, Surf. Interface Anal. 42 (2010) 1172

Figures

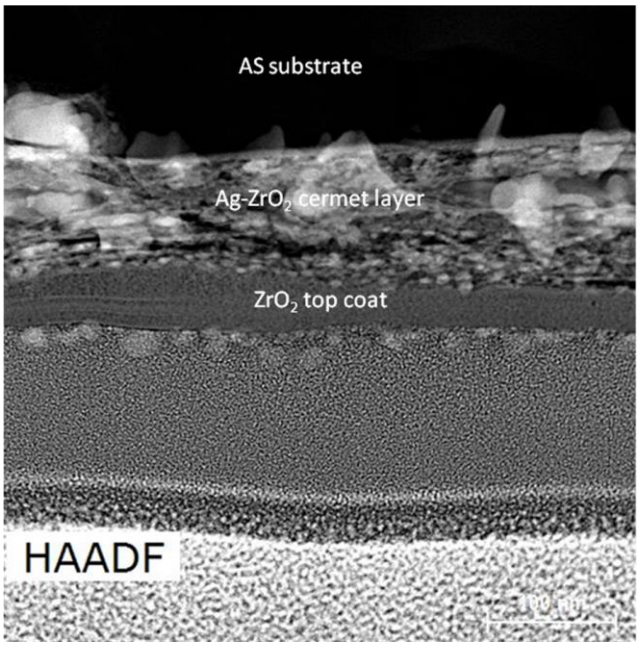

Figure 1: HAADF-STEM image of the lamella cross section of sample ZrO_2/Ag+ZrO_2/AS

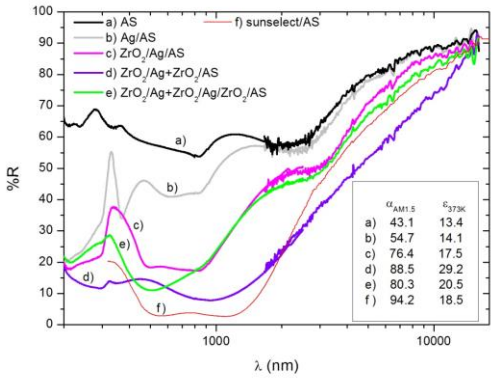

Figure 2: Total hemispherical spectral reflectance of the coatings in comparison to the aluminized steel substrate (AS). Solar absorptance for AM1.5 and thermal emittance at 373 K of the coatings and the substrate are indicated in the inset.