OPTICAL AND RADIATIVE PROPERTIES OF YSZ PLASMA-SPRAYED COATINGS

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ABSTRACT. This paper is devoted to the study of the optical and radiative properties of YSZ plasma-sprayed coatings which are widely used as thermal barrier coatings (TBCs). The effects of microstructure and oxygen under-stoichiometry have been investigated by performing directional-hemispherical reflectance and transmittance measurements over the YSZ translucent spectral region of 0.25-8 μm. The effect of under-stoichiometry has been isolated by annealing samples in air at 500°C during various times. Using the Gouesbet-Maheu model, the radiative properties (absorption and scattering coefficients) of the coatings have been evaluated by numerical inversion of their optical spectra. The differences in the scattering coefficients are discussed in terms of pore size and volume fraction, while the absorption level is correlated to the under-stoichiometry of YSZ. A prediction of the radiative properties of the coatings based on their microstructural description is attempted by applying the Mie theory in an absorbing host medium (YSZ) including monosize spherical pores.