THE POSSIBILITIES OF USING OPTICAL PROPERTIES MEASUREMENT METHODS FOR TBC RESEARCH

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The main task of the thermal barrier coatings (TBC) is to protect the base material from the effects of high temperatures and thermal shocks. Heat transfer through the multilayered structure of TBC is performed by conduction and radiation. It is important to know not only the thermal conductivity and specific heat capacity of individual materials, but also the reflectivity, transmissivity and emissivity of the individual layers and the entire structure of TBC.

Several measurement methods of material optical properties have been developed at the New Technologies Research Centre. The methods are suitable for measuring reflectivity, transmissivity and emissivity of coatings and bulk materials at room temperature (SNHRRT, SNHTRT) and high temperature (SNEHT, EDEHT). The results are usually in the form of spectral dependent quantities, the total or band values can be further evaluated. The measurement method of emissivity of semitransparent coatings itself, although it is deposited on a substrate, is available for the room temperature measurements. The poster introduces a specification of measurement methods including example results for high emissivity layers.

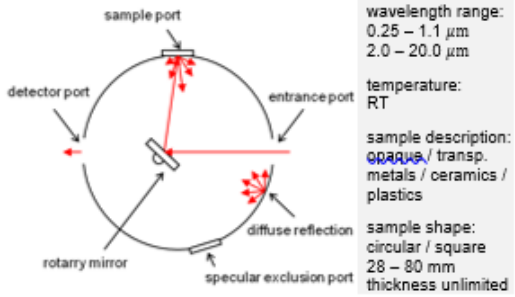

Figure 1 – spectral normal hemispherical reflectivity at room temperature (SNHRRT)

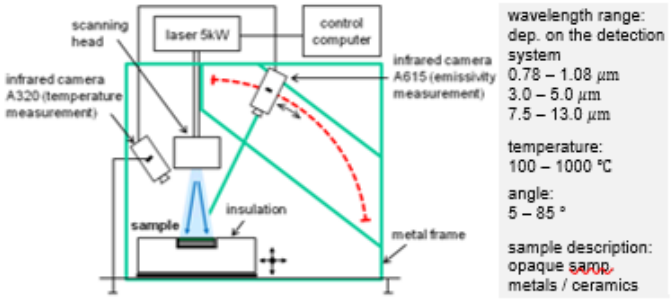

Figure 2 – effective directional emissivity at high temperature (EDEHT)

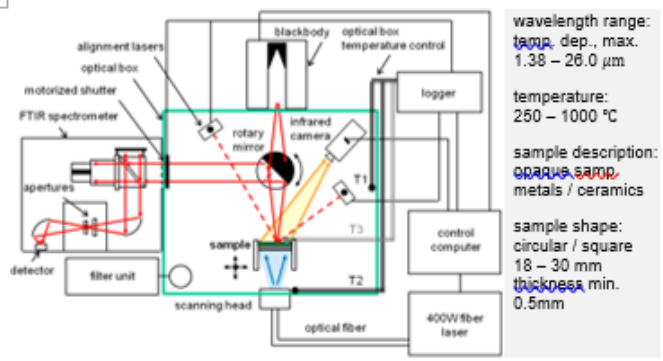

Figure 3 – spectral normal emissivity at high temperature (SNEHT)

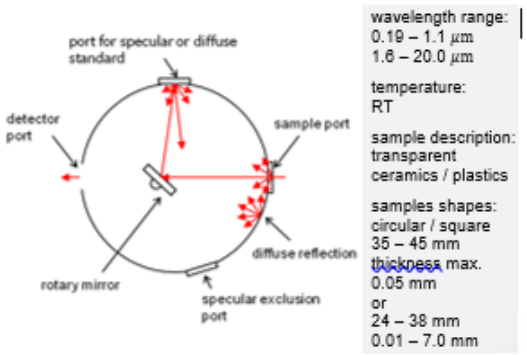

Figure 4 – spectral normal hemispherical transmissivity at room temperature (SNHTRT)

Using these measurement methods, it is possible to characterize the TBC properties important for the radiative heat transfer from the surrounding environment to the protected part.

More info about coating and bulk material measurements at https://ttp.zcu.cz/en/laboratories/optical-properties