INFLUENCE OF THE BACKGROUND RADIANCE ON THE MEASURED TOTAL DIRECT POWER OF PT–10%RH ALLOY SPECIMEN

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When measuring the total direct thermal power radiated by materials in gas environments, it is necessary to either exclude or, if not possible, take into consideration the emission of heated background [1]. An experimental setup was used to determine the contribution of the background to the measured total direct radiance power for Pt–10%Rh alloy specimen.

The experimental setup consisted of an electric heater, a sensor to measure the radiance of a specimen, and a two-part copper housing with water cooled walls. The measuring sensor resembled a water cooler diaphragm and a thermocouple detector [2] behind it. The two parts of the copper housing were installed in between the heater and the water cooler diaphragm, and in between the water cooled diaphragm and the detector. A screen painted by black absorber [3] was mounted on the water cooled diaphragm on the specimen's side. Measurements were taken in the range of temperatures between 72°C and 640°C.

The performed study showed that the main influence on the measured total direct power is caused by the background radiance of the heater unshielded by the specimen and reflected from inner walls of the copper housing. Application of the thermal radiation absorbing material [3] on the inner cavity of the housing allowed measuring the total direct power radiated by the Pt–10%Rh alloy specimen with uncertainty of 2.5% at the temperature of 640°C.

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2. Thermal Power Sensor Head, `https://www.thorlabs.com/thorproduct.cfm?partnumber=S302C`
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