

## HEAT FLUX AND SURFACE TEMPERATURE MEASUREMENTS IN HIGH ENTHALPY PLASMA FLOWS

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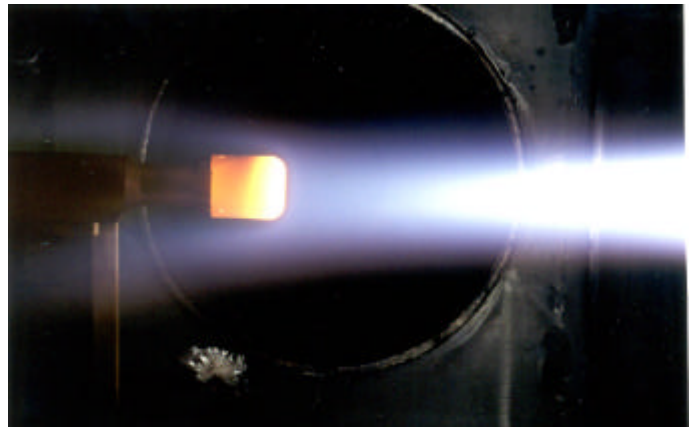
During a re-entry the space vehicle has to withstand very severe conditions. In order to evaluate the quality of its Thermal Protection System (TPS), one has to study the effect of chemistry in the vicinity of the vehicle nose since it deeply influences the thermal load. For this purpose we must be able to accurately quantify heat fluxes and surface temperatures.

First we concentrated on ways to perform heat flux measurements on cold walls. The standard technique for calibration purposes uses a water-cooled calorimeter made of copper. We showed that the assembling of the probe had almost no influence on measurements. We changed the material (Fig 1) to study the effect of chemistry. Results were discussed and compared with another standard technique that uses an uncooled copper cylinder.

Then we investigated surface temperature measurements on hot walls (Fig 2). The severe conditions had to be taken into account since it strongly limited the available technical solutions for contact measurements by thermocouple. For non-contact measurements we used a two-color pyrometer and showed the importance of calibrating the whole optical setup.



*Figure 1: Molybdenum water-cooled calorimeter*



*Figure 2: TPS sample during a test*