

Experimental Setup for the Retrieval of Optical Properties of Materials in Solid and Liquid States

Domingos De Sousa Meneses^{C, S}

CNRS, UPR3079 CEMHTI, Université d'Orléans, Polytech'Orléans, Orléans, France

Jean-François Brun

CNRS, UPR3079 CEMHTI, Université d'Orléans, Orléans, France

Benoît Rousseau and Patrick Echegut

CNRS, UPR3079 CEMHTI, Université d'Orléans, Polytech'Orléans, Orléans, France

The retrieval of the optical properties of materials at very high temperatures is a really difficult task with conventional techniques such as infrared reflectance or transmittance. Indeed when the samples are heated within laboratory furnaces, the resulting thermal radiation blinds the detectors. A pragmatic solution is to measure directly the emittance of the materials and to extract from it the desired quantities as we have shown previously [1,2]. In this communication, we will present a new generation of emittance setup with enhanced performances. The device is built around two Bruker spectrometers, a Vertex 80 V and a Vertex 70, that allow one to cover the whole spectral range from far infrared to visible, i.e. from 10 to 25000 cm^{-1} . A Coherent CO_2 laser with a power of 500W ensure the sample heating within a cold surrounding, which is mandatory for performing accurate emittance measurements. The setup is able to characterize opaque and semitransparent materials from 400 to 3000 K. In situ measurement of the glass transition and measurements carried out on other glasses and crystals will be presented to show the performances of the setup. The contribution of the new device for the study of optical properties, thermal radiation and structural phase transitions will be finally treated.

[1] O. Rozenbaum, D. De Sousa Meneses, S. Chermanne , Y. Auger, P. Echegut, Rev. Sci.Instrum.70 4020-4025 (1999)

[2] D. De Sousa Meneses, J.F.Brun, P.Echegut, P.Simon, Applied Spectroscopy 58 969-974 (2004)