VA 5: Vacuum measurement and instrumentation

Time: Monday 14:40–15:20 Location: H40

VA 5.1 Mon 14:40 H40

Vacuum measurement: state-of -the-art gauges and achievable accuracy — •Wolfgang Jitschin — Fachbereich MNI, Fachhochschule, 35390 Giessen

Modern vacuum gauges employ well approved functional principles: in the rough vacuum regime the piezoresistive or the capacitive sensor, in the fine vacuum regime the Pirani sensor and in the (ultra-) high vacuum regime both the hot and the cold cathode ionization tube. For the calibration of the gauges, primary standards such as the piston gauge and gas expansion apparatuses are available. Their accuraries can be estimated by careful analysis of errors and their propagation.

Regular recalibrations of the gauges provide information on their repeatability as well as on their stability with time. Frequently, the stability is a crucial issue for users of the gauges. Even in case of careful operation, statistical changes may originate from the influence of ambient conditions and systematic changes may be caused by aging effects. Comprehensive empirical data of the stability are now available. Modern state-of-the-art Pirani gauges are stable better than 1 %. Bayard-Alpert gauges are stable within a few percent after an initial period of running-in. Even some cold-cathode gauges are stable within 10 %. These data provide reliable information for judging the accuracy achievable in the usage of the gauges.

VA 5.2 Mon 15:00 H40

Construction of an imaging radiation pyrometer for temperature and spectral monitoring in harsh environment conditions — •Carlos A. Calle[1,2], Edgardo A. Cisternas[1,2], Gastón Martínez[1], Pedro Pedraza[1], and Ulrich G. Volkmann[2] — [1]Dept. of Research and Development, Tecnología Integral S.A., Santiago de Chile — [2]Dept. of Physics, P. Universidad Católica de Chile, Santiago de Chile

We developed and build an imaging radiation pyrometer with an integrated VIS-NIR spectrometer. The device combines video and spectral data, which allows on-line monitoring of thermal processes inside of industrial furnaces and other harsh environments. The device combines two-band and multiwavelength pyrometry in the range from 800°C to 1500°C, with temperature resolution in the order of +/- 5°C (or 2%). The device was tested in a rotatory kiln at a local cement plant. From the spectral response we found two emission peaks corresponding to alkaline material present in the raw material. The high of the peaks can be correlated to the quality of the sintering process and with the existence of various phases in the final product (clinker).

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