

**P 31 Hauptvortrag 9: Diagnostik**

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**Hauptvortrag**

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**On progress in plasma process analysis using quantum cascade laser-absorption spectroscopy** — •F. HEMPEL, N. LANG, J. RÖPCKE, G.D. STANCU, and K.-D. WELTMANN — INP Greifswald, 17489 Greifswald, Germany

The recent development and commercial availability of quantum cascade lasers (QCL) offers a new option for mid-infrared absorption spectroscopy as a technique for an improved understanding and control of chemical active discharges. Pulsed QCL are able to emit mid-IR radiation near to room temperature. QCLs allow the realization of very compact mid-infrared sources characterized by narrow line width combining single-frequency operation and high power values, sufficient to combine them with thermoelectrically cooled infrared detectors. This permits a decrease of the apparatus size and gives a unique opportunity to design compact liquid nitrogen-free mid-IR spectroscopic systems. These positive features of QCLAS systems have opened up new fields of application in research and industry, including studies of gases in atmospheric, environmental and plasma chemistry but also for in-situ control of industrial plasma processes. This contribution describes a compact QCL based measurement and control system (Q-MACS) which has been developed for time-resolved plasma diagnostics, process control and trace gas monitoring. A rapid scan software with real-time line shape fitting provides a time resolution up to 1  $\mu$ s to study kinetic processes of infrared active compounds in plasmas or gases. With examples of phenomena in plasmas and trace gas detection the capabilities of the Q-MAC system is demonstrated.