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In situ plasma process monitoring of BCl_3 using quantum cascade laser absorption spectroscopy NORBERT LANG, JÜRGEN RÖPCKE, FRANK HEMPEL, Leibniz Institute for Plasma Science and Technology, F.-Hausdorff-Str. 2, 17489 Greifswald, Germany, SIEGFRIED STRÄMKE, ELTRO GmbH, Arnold-Sommerfeld-Ring 3, 52499 Baesweiler, Germany — BCl_3 is used as a source gas in various industrial plasma applications. The online monitoring of its ground state concentration in the plasma process reactor is vital for an improved insight into the plasma chemistry and to increase productivity, reliability and reproducibility of the process. Quantum cascade lasers offer attractive options for the application of mid-infrared absorption spectroscopy for in situ monitoring and control of industrial processes. In this contribution we report on a compact quantum cascade laser measurement and control system (Q-MACS) combined with an infrared-fiber to allow a flexible and completely dust-sealed optical coupling to the reactor chamber of an industrial plasma surface modification system. For different process regimes the absolute concentrations of the precursor BCl_3 were measured in a pulsed dc discharge containing $\text{Ar}/\text{N}_2/\text{H}_2$ and BCl_3 at a pressure of 200 Pa. A synchronization of the Q-MACS with the process control enabled an insight into individual process cycles with a sensitivity of $10^{-6} \text{ cm}^{-1} \cdot \text{Hz}^{-1/2}$.

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