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Monitoring of volatile vacuum species using remote optical emission spectroscopy

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Conventional residual gas analysers, such as quadrupole RGAs, have difficulty directly monitoring certain processes due to the high process pressures (typically above $1\text{E-}4$ mbar) and the presence of volatile species such as hydrocarbons. These hydrocarbons often contaminate the RGA filaments, rendering the sensor unusable.

An alternative gas monitoring sensor that operates directly at pressures above $1\text{E-}4$ mbar has been built around plasma emission monitoring. A small "remote" plasma can be generated inside a vacuum sensor. Consequently, species that are present within the vacuum become excited in the sensor's plasma, emitting a spectrum of light, which can then be used to identify and monitor the emitting species. Crucially, this sensing method has been shown to be robust when exposed to the CVD and ALD processing environments.

This presentation will describe the principle of this sensing method and results that can be achieved in areas that cannot be addressed easily by conventional RGA technology. Detailed information will be presented of its use in monitoring both thermal and plasma ALD processes that use precursors such as water vapour, ammonia and aluminium and niobium based hydrocarbons.

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