In-situ Infrared and optical emission spectroscopy on atmospheric pressure plasma-enhanced spatial ALD of Al_2O_3

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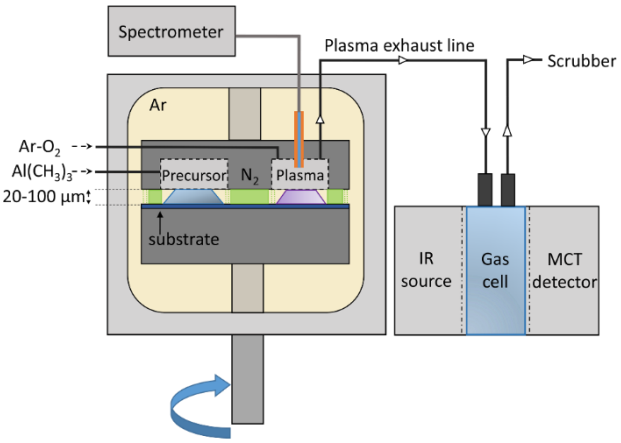

Figure 1 Schematic showing the *in-situ* diagnostics assembled on the atmospheric pressure plasma-enhanced SALD reactor. Optical emission spectroscopy is performed with a thermally resistant optical fiber inserted into a transparent dielectric barrier discharge microplasma source. Gasses exhausted from the plasma slot are analyzed in the gas cell placed inside the FTIR spectrometer.

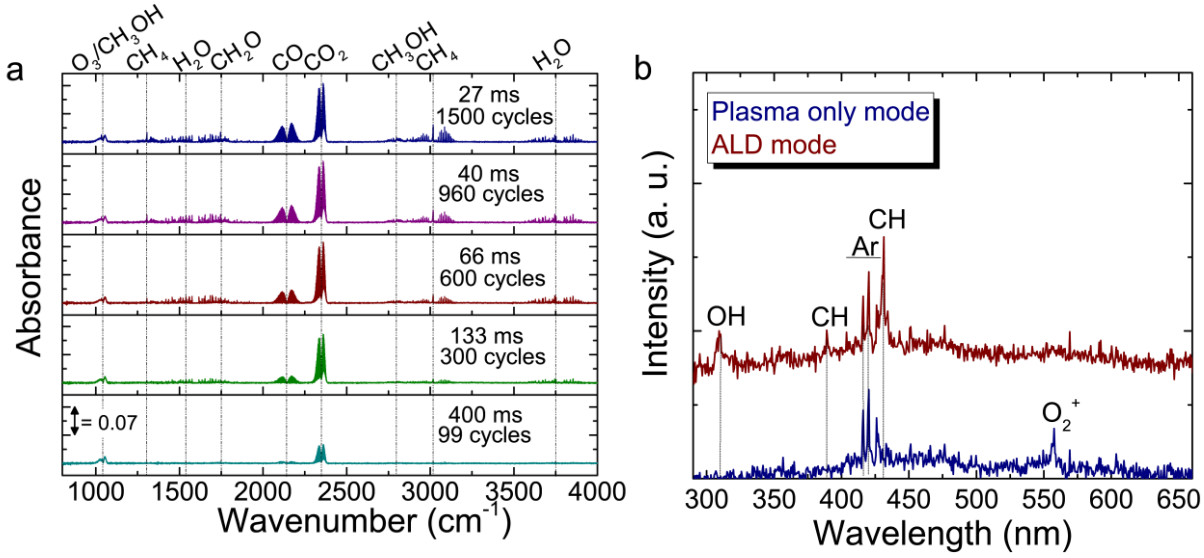

Figure 2 (a) Infrared spectra of exhausted plasma gases for plasma-enhanced AP-SALD of Al_2O_3 films at different exposure times (i.e. different substrate rotation speeds). For a fixed measurement time, the amount of ALD byproducts decreases with increasing exposure time of the surface to the precursor. (b) OES spectra in "plasma only mode" and "ALD mode" during the deposition of Al_2O_3 films. The emission spectrum of the plasma shows characteristic features of an atmospheric pressure Ar-O_2 plasma with strong Ar emission lines. When $Al(CH_3)_3$ is activated and ALD reactions take place, emission from excited OH, CO and CH arises as an indication of surface reactions between adsorbed $Al(CH_3)_x$ and plasma oxidizing species.