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VUV light source based on Cl-atom emission produced by a microdischarge VIRGINIE MARTIN, GERARD BAUVILLE, VINCENT PUECH, Univ.Paris-Sud & CNRS — Cl2 based plasmas are widely used to etch silicon in semiconductor manufacturing. The etching rates are dependent on the Cl-atom flux impacting onto the surface, so that the measurement of the Cl atom density is of prime importance. However accurate measurements of Cl atom density in the plasma is still a challenge and only rough estimates are usually indirectly obtained. We developed a VUV light source emitting on the resonance lines of Cl atom which could be implemented on any etching reactor to perform direct measurements of the Cl atom density through absorption spectroscopy. The light source is mainly composed of a micro hollow cathode discharge (MHCD) operating in an Ar/Cl2 mixture. The diameter of the MHCD hole is lower than 1mm resulting in a high current density discharge with a high density of excited Cl atoms. While the discharge spreads on the back side of the cathode, it remains confined inside the hole on the anode side, in such a way that the plasma appears as a point-like source which can be easily coupled with the entrance slit of a VUV monochromator. In the range 130-140nm, the evolution of the emission intensity of the Cl lines have been studied versus the partial and total pressures and the discharge current. The best discharge conditions allowing achieving simultaneously good spectral resolution, high emission intensity and long term stability will be reported.

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