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Various analytical methods have been proposed for plasma diagnosis and process analysis. The plasma analysis with Langmuir probe and optical emission spectroscopy is widely used for analyzing ion and electron characteristics and plasma light. Recently, laser and charged coupled device (CCD) sensor has been applied very effectively in monitoring ion density and plasma light.[1-2] The successful achievements[1-2] were attributed to the transfer of the interaction between laser light and plasma to the image taken by the CCD sensor. The CCD image is then characterized by the pixel sum distribution function (PDF) as demonstrated in the works.[1-2] Six PDFs were obtained as the flow rate of N2 was increased from 3 to 18. The variation of the accumulated pixel sums calculated at an optimal grayscale range was very similar to the variation of the ion density measured by the Langmuir probe. These results can be explained by the previous claims[3-4] that the laser light is composed of material and particle containing energy. Unlike the position between the laser light and chuck,[1-2] the laser light passes the plasma in a vary close position with the chuck. The structure of the sheath was able to be visualized by drawing variations of ion density along the axial line. This is a new method for monitoring a sheath only in view of the variation of ion density.

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