W-07

Plasma Diagnostics by multiple probe array in ICP assisted magnetron sputterin

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Abstract

Large area processing system requires a few m2 size plasma source development technology. It requires two fundamental skills: real time 2D plasma diagnostics and full 3D modeling of a reactor. Inductively Coupled Plasma has been used for its simple design and high plasma density (>1012 #/cm2) in semiconductor wafer processing industry. However, increasing the size of ICP antenna fails in uniformity for m2 size plasma source. Sources of non-uniformity are induced electric fields and gas distribution. Both sources are strongly depend on counter electrodes or substrate assembly in magnetron sputtering. In-Line type magnetron sputtering system, moving carrier will be another source. We developed 3×9 probe array and analyzed measured voltage non-uniformity in real time.

The second source of non-uniformity will be gas distribution which could be improved by numerical modeling. One difficulty would be computational cost for full 3D reactor in m2 size which generally requires multi million cells. To attack this problem we setup 4 node 8 core cluster computer based on commercial a few Gflops CPUs. Various design and its effects will be addressed in the presentation.

Fig. 2D probe array plate Fig. 3D numerical modeling for uniform plasma generation

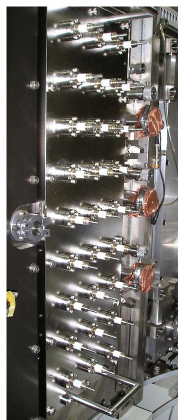

Fig. 1 2D probe array plate

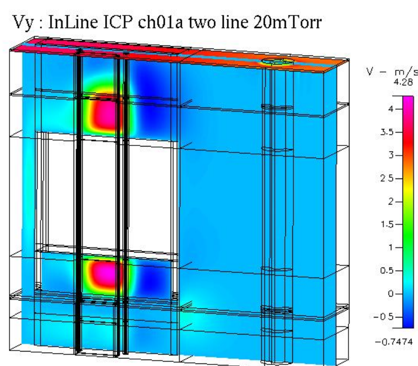

Fig. 2 3D numerical modeling for uniform plasma generation