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Inductively coupled plasma etching of chemical vapor deposition amorphous carbon in $O_2/N_2/Ar$ chemistries

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In this study, we investigated the fabrication process of multi-level resist (MLR) based on thin chemical-vapor deposited (CVD) amorphous carbon (a-C) layer. Etching characteristics and mechanism of CVD a-C layer with the SiO_2 hard-mask were investigated in an ICP (inductively coupled plasma) etcher by varying the process parameters such as different top and bottom powers, O_2 and N_2 flow rates in $O_2/N_2/Ar$ plasmas. The results indicated that the etch rate of CVD a-C increased with increasing the top and bottom powers. And the etch rate of CVD a-C was increased with increasing the O_2 flow rate in $O_2/N_2/Ar$ plasmas. Application of CVD a-C layer as a mask for etching of the TEOS-oxide in the stack of ArF PR/BARC/SiO_2/CVD a-C/TEOS-oxide/Si was also investigated. Mechanism of etching and selectivity during etching of under layer in MLR structure will be discussed in detail.