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A Study on the Etching Characteristics of High aspect ratio Oxide Etching Using C4F6 Plasma in Inductively Coupled Plasma with Low Frequency Bias

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Abstract : In this study, high-aspect-ratio (HAR) oxide etching characteristics in inductively coupled plasma were investigated using low frequency (2 MHz) bias power with C4F6 gas. An experiment was conducted using CF4/C4F6/He as the mixed gas. A 100 nm (etch area)/500 nm (mask area) line patterns were used, and the etch cross-section and etch selectivity of the amorphous carbon layer thin film were derived using a scanning electron microscope. Ion density was extracted using a double Langmuir probe, and CFx and F neutral species were observed via optical emission spectroscopy. Based on these results, the possibility for HAR oxide etching using C4F6 gas chemistry was suggested in this work. These etching results also indicate that the use of C4F6 gas can significantly contribute to the development of next-generation HAR oxide etching.

Keywords : plasma, etching, C4F6, high aspect ratio, inductively coupled plasma
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