
Large-Scale Etching of Silicon Nitride Using a Linear ECR Plasma Source With Reciprocating Substrate Motion

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We have etched 700 nm thick silicon nitride (SiN_x) on $370 \times 235 \text{ mm}^2$ substrate using a linear electron cyclotron resonance (ECR) plasma source with reciprocating substrate motion. A mixture of NF_3 and Ar gases was used as etch gas. The etching of SiN_x was performed with and without reciprocating substrate motion and compared to each other. In the etching without reciprocating substrate motion, the etch rate was measured in 45 points, showed 17.5% uniformity and the average etch rate was 92 nm/min. For the etching with reciprocating substrate motion, 4% uniformity of etch rate and 72 nm/min etch rate were obtained in the same measuring points. Moreover, there were no stains left on $370 \times 235 \text{ mm}^2$ SiN_x glass after the etching with reciprocating substrate motion. In this paper, the linear ECR plasma source with reciprocating substrate motion is proved to be suitable for large-sized substrates and is profitable due to high yield and low-cost manufacturing.