A linear combination model for analyzing long-timedata trend in a plasma etching process

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Design rule of semiconductor devices has decreasedconsistently for productivity and low power performance. Dry etch process is alsoneeded for smaller and more precise patterning, but it is extremely difficultfor dry etch to satisfy best process qualities for a long time due tocharacteristic and environmental change of its equipment with passage of time.We propose a linear combination model to analyze the long time trend of a dryetch process. This model consists of input factors, a process out trend and theprimary parameter which is the sensor data of matching the process output trendsimilarly. The linear combination of input factors is compared with the primaryparameter trend. Some input factors whose characteristics are not similarlymatched to the primary parameter are excluded, and then the rest input factorsremain to be effective input factors. The analytic model was applied to thecontact etch process which has an abstruse time trend of its criticaldimension(CD) and contributed to improve control of the CD trend.