Introduction of Thickness monitoring Sensor, SR as IntegratedMetrology in PECVD system

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Generally current device trend are following as device shrinkage and high integrity to achieveintegration and miniaturization of devices. So new eyes(sensors) arerequired in process diagnosis/measurement systems to realize above trend. Process diagnosis/measurement technology has evolved in the following as Fault Detection and Classification(FDC), Virtual Metrology(V/M) and Integrated Metrology(I/M). The candidate of new eyes mentioned above will be Integrated Metrology.

In this presentation, we will describe real time thickness monitoring sensor using Spectral Reflectometer(SR), one of the Integrated Metrology. Since it is a plasma process, measuring the thickness of a sample in a chamber is not easy for reason as structural problem in Shower Head(S/H) and Radio Frequency(RF) radiation effect, etc. However, we succeeded in developing the SR sensor by solving these various problems. Two types of SR sensors(in-situ and ex-situ type) are developed and each sensor is applicable depending on the measurement purpose. For example, in-situ type SR sensor is applicable when user want to real time measurement the layer to layer thickness in stacked multi-layer samples. Also ex-situ type SR sensor is only used when measuring the total thickness of samples. However, it is cheaper than in-situ type. Finally measurement error rate of in-situ and ex-situ type SR were obtained as ±1.5 %, ±0.3 %, respectively.