
Experimental study on arcing detection technology in PECVD process

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Current time, devices are following as device shrinkage and high integrity to achieve integration and miniaturization of devices. According to this trend cause some problems such as arcing issue in chamber due to warpage of wafer. In general, measurement of electrical parameter has been commonly used to detect arcing that occurs during the PECVD process. However, this method cannot classify hard-arcing which enough to damage the wafer. Most of the arcing that occurs in the process plasma does not cause defects in semiconductor devices. The arcing that causes defects in devices has several features, such as wafer warpage, plasma condition, hardware structure in process chamber. In this paper, we discuss various experimental approaches to detecting arc phenomenon in PECVD process. We have observed the characteristics of factors that cause arcing through an analysis of wave form passing through the plasma source. The three proposed methods according to process condition are as follows: 1) High-speed sensing, 2) Statistical method, 3) Harmonic Analysis. Experiment was performed in severe conditions in which arcing can occur during the process plasma. Experimental results show clearly that abnormal data trend in inducible wafer which can cause occur arcing faults. The results are in good agreement each other in proposed method.