OPTIMIZED MEASUREMENTS OF PLANARITY OF THE NANOSTRUCTURE SURFACES

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In micro- nanofabrication planarity of the surfaces is the key of successful process flow. Defects, caused by processes such as etching, inhomogeneity caused either deposition or sputtering can be detected via special metrology techniques and tools. Detection can be done in two ways: by a digital image comparison technique or by laser scanning technology. Noticeable, that both techniques are used in industry and science. Laser scattering tool mostly destined for blank monitor wafers, as image comparison is for patterned wafers.

Basic principle of digital image comparison method is following: the tool compare pixel of one die to that of the preceding and succeeding die. If the difference is significant coordinate is marked as a defect. This method is not suitable for such processes that envisage inhomogeneity of the layer, i.e. Chemical Mechanical Polishing. A laser scan across the entire wafer is the second method for measuring defects. Once defect is present on the wafer, laser light is scattered away and collected by photomultiplier tube, whose magnitude is proportional to the size of the particle. The next step is to detect scattered laser light that can be easily done by charge-coupled diode camera. The last step is intensity calculations, repetitive pattern filtering (so called Fourier masking), and polarization characteristics. Mentioned calculus decrease false identifications of the defects on the wafers.

Atomic force microscopy can be an alternative to laser scanning and image comparison methods. Advantages of this method are high spatial resolution, and ultralow force exerted at the surface. Indicated metrology can increase the success of the defect detection and improve characterization quality of the flatness of nanosurfaces.

Supervisor: Tobias J. Kippenberg.

1. *Chemical Mechanical Polishing in Silicon Processing* (Ed. Shin Hwa Li, Robert O. Miller) (The USA: Academic Press: 2000).