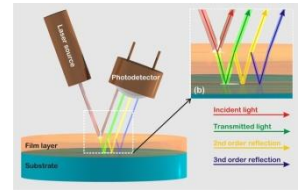


ThetaMetrisis APPLICATION NOTE #048

Measurement of Si wafer thickness



Introduction:

Silicon is the fundamental material for electronics industry. Its unique properties along with the huge investments in manpower and infrastructure in research and industry, revolutionize our world during the last decades. Measurement of Si thickness is of high interest with particular emphasis in Si membranes, Si wafer and failure analysis. In this application note the thicknesses of Si wafers of various standard diameters (3-inch, 4-inch, 6-inch, 8-inch, 300mm) are measured by using FR-Tools.

Means & Methods:

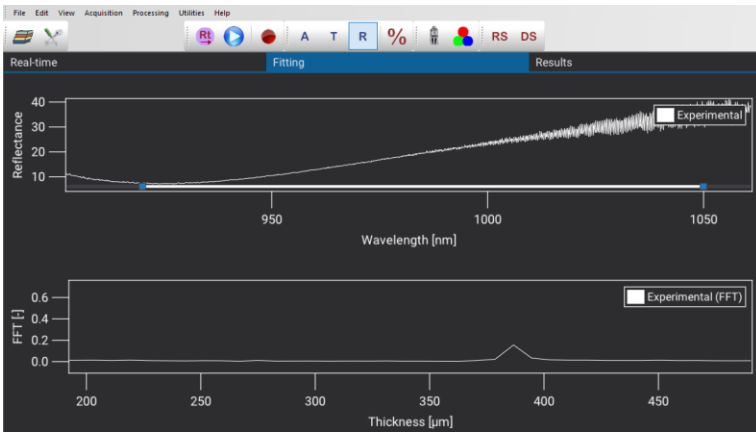
Samples under characterization were Si wafers of various standard diameters (4-inch, 6-inch, 8-inch, 300mm) and thicknesses. All wafers were Double Side Polished, either N or P type and acquired by various vendors. For the measurements, two FR-tools were employed: a) an **FR-pRo NIR N2** operating in the **900-1050nm spectral range** and equipped with Si-based spectrometer and capable for measurement of 600microns Si thickness and b) and an **FR-pRo NIR N3** operating in the **1280nm-1350nm spectral range**, and equipped with InGaAs-based spectrometer and capable for measurement of 1.0mm thick Si.

Results:

Typical experimental reflectance spectra (top) as recorded by the FR-Monitor software and the appropriate FFT algorithm applied on the reflectance spectrum (bottom) are illustrated in the figures below. The 3-inch and 4-inch Si wafers, are within the specifications of FR-pRo NIR N2 and for that reason those wafers were characterized by that tool. On the other hand, the thicknesses of 6-inch, 8-inch and 300-mm wafers fall into the specifications of FR-pRo NIR N3 and that tool was employed in the characterization of those wafers. The peak (on FFT vs Thickness spectrum) corresponds to the thickness of the Si wafer.

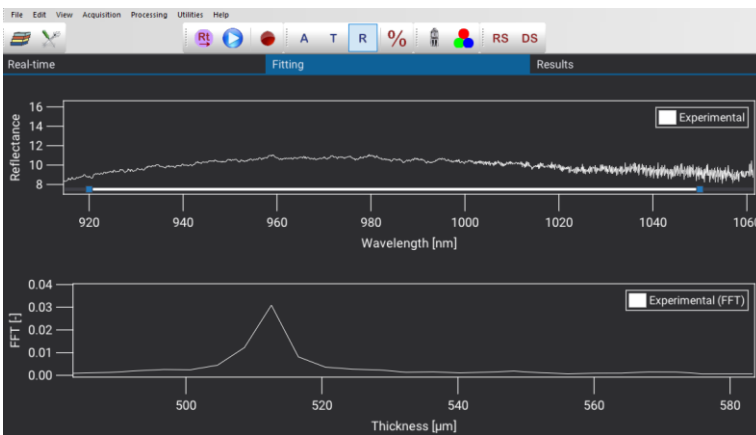
The same wafers were also measured by a mechanical gauge and the results are compared in the following table.

Sample	Thickness (μm) FR-pRo NIR	Thickness (μm) Mechanical gauge
3inch Si wafer	383	381
4inch Si wafer	514	513
6inch Si wafer	637	634
8inch Si wafer	748	744
300mm Si wafer	788	790



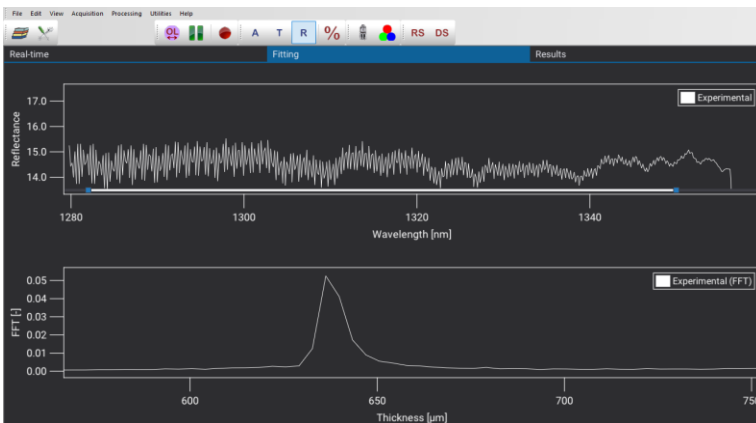
3-inch wafer

Thickness: 383microns



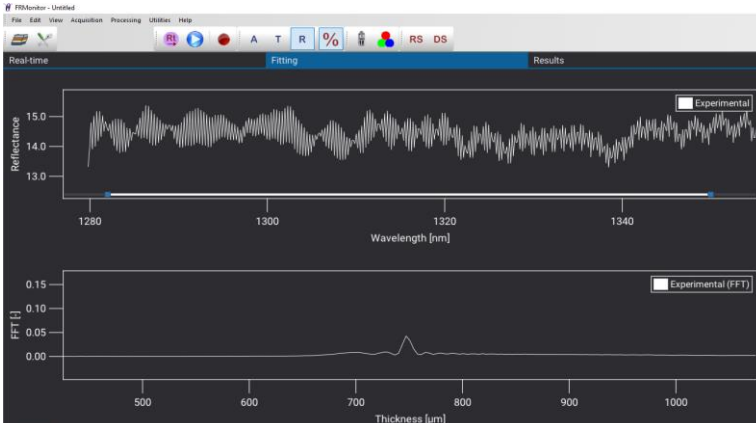
4-inch wafer

Thickness: 514microns



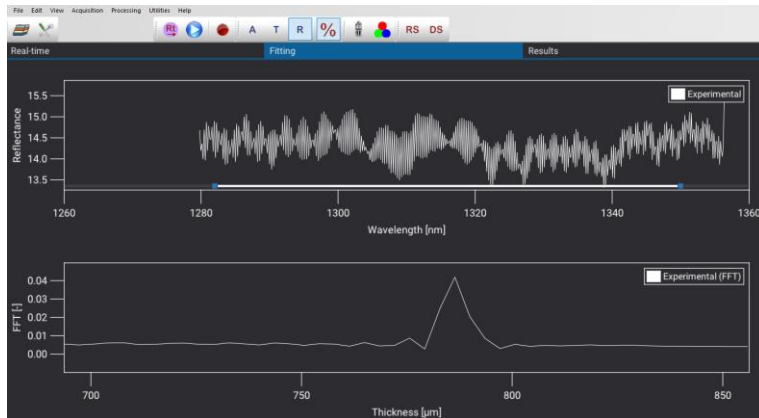
6-inch wafer

Thickness: 637microns



8-inch wafer

Thickness: 748microns



300-mm wafer
Thickness: 788microns

Conclusions:

The thickness of the Si wafers of various diameters was measured by standard **FR-pRo NIR tools**.