



Thin Film Measurement solution
Software, sensors, custom development
and integration

THICKNESS MEASUREMENT OF ANODIZED ALUMINUM LAYER

Anodizing is an electrochemical conversion process that is widely used for many applications. Unlike most protective coatings, anodizing permanently changes the outer structure of the metal. The alumina layer formed during anodizing has hardness similar to a diamond and high abrasive resistance.

Anodizing is, typically, ranges from 0.5 μm to 100 μm thickness. Three most common aluminum anodizing include chromic (type I), sulfuric (type 2) and hard (type 3).

Type 1 (chromic acid electrolyte) yield the thinnest coating (0.5 – 3 μm) and has least effect on the fatigue strength. It is most frequently used in military and aerospace application

Type 2 (sulfuric anodizing) yields thickness up to 25 μm . This anodizing most frequently used for decorative purposes.

Type 3 (hardcoating anodizing) uses higher concentration of sulfuric acid at lower temperature resulting in the thick (~ 100 μm) coating with the tough outer skin. This type of anodizing is frequently used for building materials, photocopiers paper rolls, etc.

Anodizing process parameters have a significant influence of the thickness the formed layer. Through various process controls and thickness measurement Anodizers are able to control and correct the anodized coating applications. This is especially important for the thin (Type 1) anodizing.

Clear anodized layer thickness can be easily measured with MProbe 20 spectroscopic reflectometer. The non-destructive optical method allows quick (< 1s) measurement on different surfaces.



Fig. 1 Anodized Aluminum part (Type 1 anodizing)

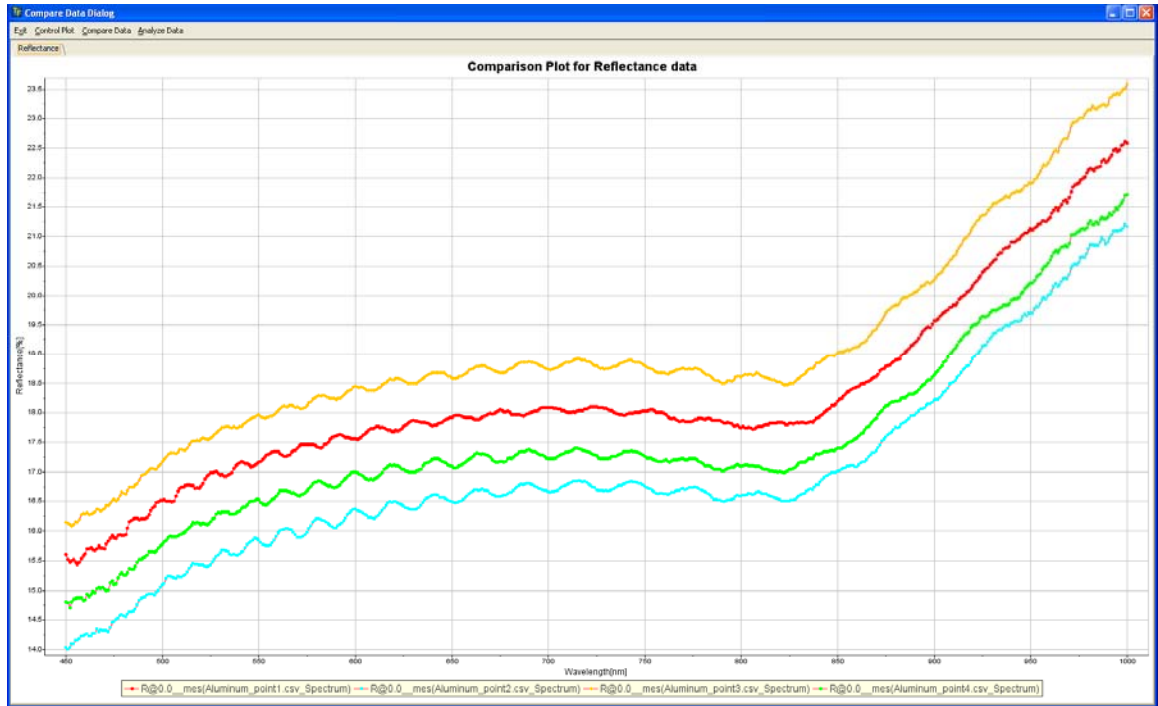


Fig. 2. Reflectance spectra measured at 4 different points, wavelength range: 450-1000nm. The oscillations (interference) in the spectra indicates the presence of the layer

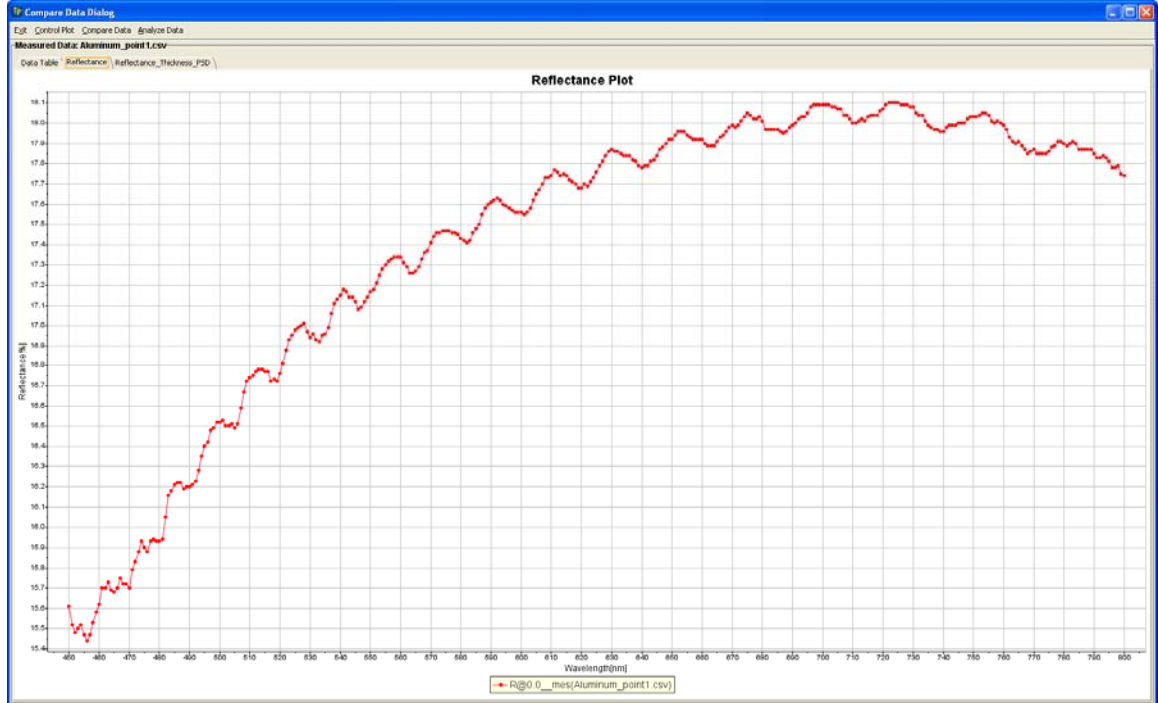


Fig. 3. The part of the spectrum (510-800nm) that contains most useful information and was used for the measurement.

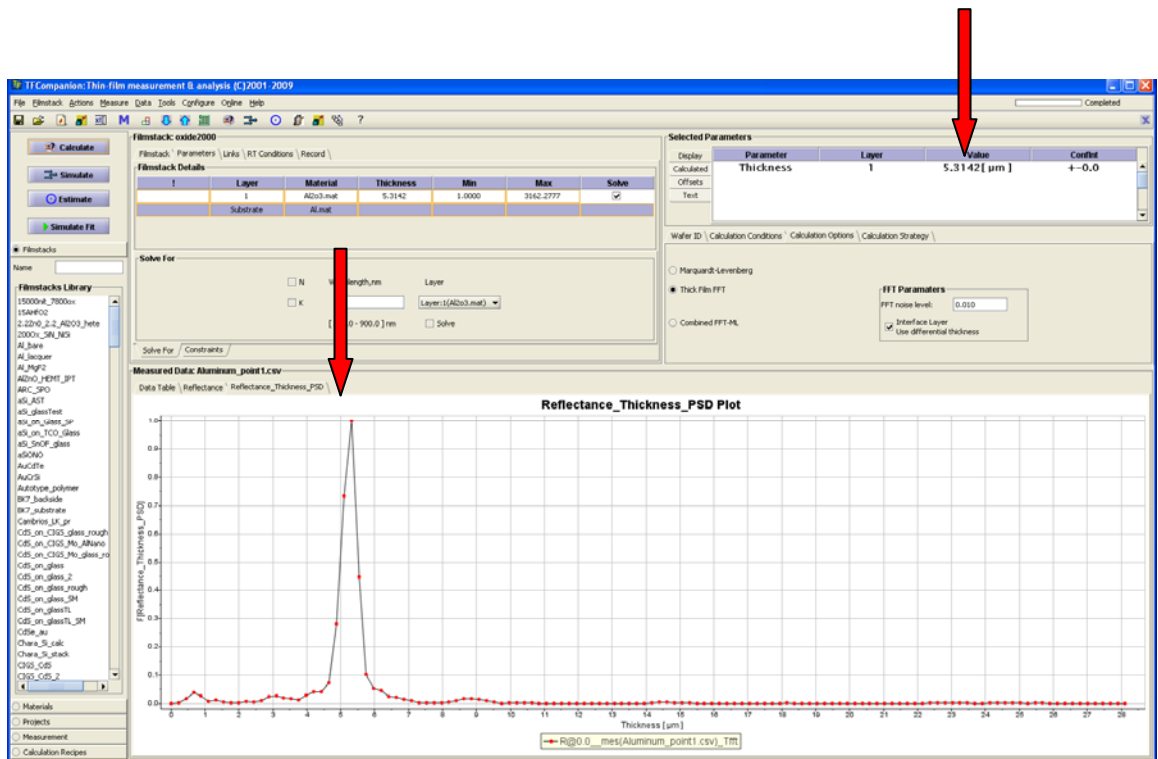


Fig. 4 Results of the measurement. Peak position indicates the thickness of the Anodized layer. The value of the thickness is displayed in the table

Point	Thickness, μm
1 (center)	5.314
2	5.093
3	5.093
4	5.093

Table 1. Results of the measurement in 4 points across the surface