

Meta Title: How is Film Thickness Measured?

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How is Film Thickness Measured?

A thin film thickness measurement is made by measuring the interference between the light from the top interface and the bottom interface. Essentially, a thin film is a type of layered material that has a variety of thickness ranges. The main reason why you may need to understand thickness measurements is so you can have complete control over the creation of optimal product functions and designs. This includes microspectrophotometers for microscopic sampling areas, where you need the right thickness measurement tools. Here is what you need to know when making a thin film measurement.

The Basics of Thin Films

Whether you're trying to measure an atomic layer or microns, measuring a thin film is based on the thickness of the layers of the material. Thin films can build thin film photovoltaics, semiconductor devices and optical coatings. The main aim of these thin films is to control the outcome of product designs. That way, they can function optimally.

Film Thickness Measurements: The Principle of Interference

Measuring a single layer of film can be efficiently conducted using a spectrophotometer. However, you can only use layer thickness between 0.3 to 60 μm . This is where the principle of interference comes in. When measuring film, you need to use the refractive index because materials have different refractive indexes. The diagram above shows that the light will hit the film at a certain angle.

You can then make a film thickness measurement based on the number of peaks and valleys on the interference spectrum. Ultimately, specific wavelength ranges can help you calculate thin film thickness. But remember that a material's surface roughness affects the accuracy of thickness measuring tools and calculations. Therefore, it is essential to stick to a transparent or thin film.

However, if you need to measure a film thickness on an opaque substrate, including a wafer, you will need to use only a reflection measurement. But, if the film is on top of a transparent substrate, you should aim to use a transmission measurement and the expression below to calculate the thickness:

The Importance of Non-Contact Thin Film Thickness Measurements

Ultimately, if you are going to measure thin film, you need to understand optical constants and non-contact thin film. An optical constant is the number that describes how an electromagnetic wave moves through a material. This includes measurements for frequency, speed and the wave's attenuation. No matter what type of thickness you are measuring, including nanoindentation at 100nm, it's crucial that you use a non-contact film thickness measurement to ensure complete control over the product.

By using non-contact thickness measurement tools, you'll be able to use optical techniques that can control thickness ranges. This means that they can be used quickly, accurately and in a non-destructive manner. Not only can this ensure the quality of your thin films, but it can also be perfect for creating specific equipment, including microspectrophotometers, ensuring that your film thickness measurement is right first round.

The Advantages of CRAIC Microspectrophotometers

There are so many benefits to having a quality microspectrophotometer in your laboratory. Not only can you measure film thickness accurately, but you can also ensure that results are recorded exceptionally quickly. This means you can save time when you start your experiments. CRAIC microspectrophotometers can even record measurements from both reflective and transmission processes. This technology is even better because CRAIC tools have a spectrum that can help thin films be recorded more accurately through a specialized curve fitting technique.

CRAIC Can Help you Find the Perfect Microspectrophotometer

A [thin film thickness measurement](#) is essential for monitoring product functions. CRAIC Technologies instruments are beneficial for monitoring the thickness of films in a non-destructive and non-contact manner. That way, you can control as many factors as possible. Learn more by calling +001-310-573-8180 or emailing sales@microspectra.com.