

Differences in Optical Density (OD)

There are two possible reasons for differences in OD one is that there is a real difference and the other is that there is no difference in the films but a difference in the measurement.

It is common to find that two films of the same measured thickness have different OD. This often is indicative of differences in the deposition process leading to differences in the nucleation and growth of the coating giving differences in the coating density. The process differences can derive from differences in temperature, deposition rate, surface treatment or surface energy, different polymer type, system pressure, presence of contaminating gases, to name but a few of the possible variables.

Where a single coating is being measured and different results are produced there are other things to be considered. It is common for thin semitransparent metallized films to be measured by the manufacturer and again by their customer and for each to record a different measurement of OD. In most cases this usually turns out to be because of differences in equipment and measurement techniques. Thus where there is a very specific requirement for OD it is well worth agreeing on either both having identical measurement equipment or having an agreed calibration or conversion chart between two different sets of equipment. This would also require having an agreed set of standard coatings that can be used as for reference.

Each set of equipment requires a light source. The light ought to be identical from the type of illumination, brand of bulb as well as the voltage and current that power it. Variations may lead to a difference in the temperature of the bulb and the output colour spectrum. It needs to be decided if the 100% will include the uncoated substrate or not between the light source and detector. Other factors such as extraneous light that might also represent a variable needs also to be accounted for.

Thus unless there is an agreed calibration set of samples and/or a conversion chart it would be expected that there will always be variation in the measurements of OD.

Thus it is always good policy to manufacturers and customers to share information about measurement systems and techniques so they both have an understanding of the potential for variations and do not scrap metallized film unnecessarily.