

Dynamic Contact Angle Accessory for Thin Film Substrates

The ability to measure the wetting properties of thin films by the Wilhelmy Plate Technique has been a challenge due to the lack of rigidity in many film substrates.

Polymer film substrates such as Mylar are being used today in many industrial applications including many packaging and printing operations. These materials are typically prepared as very thin film sheets with an average thickness of less than 15 microns. The surfaces of these substrate materials are often subjected to dip coating operations to control the wettability of the surface to fit the desired end-use application.

Early attempts to characterize the wettability of these thin film substrates by the Wilhelmy Plate Immersion Technique were unsuccessful as the film sample (typically 5-20 microns thick, cut 10-30 millimeters square and held in place by a traditional single point sample holder) passed through the air/liquid interface, the sample was observed to lay down or bend, failing to penetrate the interface perpendicular to the liquid surface layer (see *Figure 1*). This phenomenon was first observed with a 12 micron thick sample of Mylar film prepared in the manner described above.

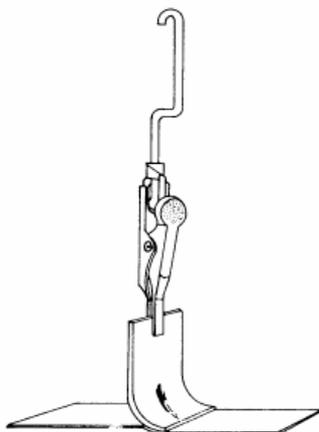


Figure 1: Mylar film held by traditional single point sample holder fails to penetrate the air/liquid interface.

After studying this phenomenon and experimenting with several options aimed at overcoming the flotation, Thermo Cahn application engineers came up with a solution. A new type of sample holder was developed (see *Figure 2*) to increase the rigidity of the film by forcing the sample into a slight curved orientation perpendicular to the air/liquid interface.

The Thermo Cahn Thin Film Sample Holder (*Part #21107-02*) is recommended for use with most thin non-rigid materials including a variety of thin films and foils. Samples are prepared in the usual manner with vertical sides approximately 10 millimeters apart (sample holder 12 millimeters wide) and inserted into the thin film sample holder with the length of sample exposed for wettability scanning limited to 5-10 mm depending on the flexibility of the sample.

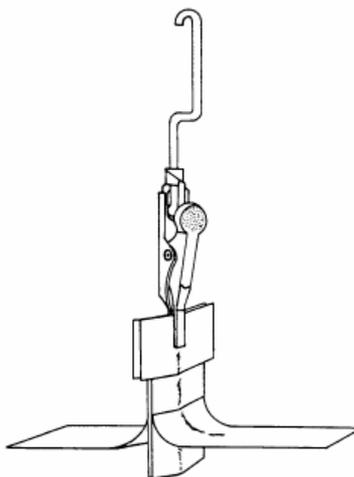


Figure 2: Mylar film readily penetrates air/liquid interface when held rigidly between copper-beryllium plates of Cahn

The holder is constructed of a rigid alligator clip design with two parallel copper-beryllium plates attached at one end. The plates have matched curvatures to sandwich the film sample uniformly and thus force the film into a rigid conformation. All users of Thermo Cahn DCA Systems can utilize the Thin Film Sample Holder.

Thermo Cahn's Thin Film Sample Holder opens up a whole new class of materials to experimentation by the Dynamic Wilhelmy Plate Method.