

Laboratory 4
Contact Angles as a Function of Immersion Time
And Advancing and Receding Angles

Contact angles were explained in some detail in the write up for laboratory 3. In laboratory 3, you measured contact angles on a monolayer that should have been well-organized (you used long immersion times). In this laboratory, you will measure the contact angle on more disordered monolayers. Additionally, you will make measurements of both advancing and receding angles on well-organized and disorganized substrates. Presumably both contact angle hysteresis and surface energy should correlate with monolayer organization.

1. Plasma-clean a substrate and determine its n and k values. Immerse the substrate in a 10^{-4} M octadecanethiol solution for 30 minutes to make a monolayer, rinse the monolayer as usual, and measure its thickness.
2. While waiting for the monolayer to form, take the slide that you placed in thiol solution in laboratory 3 and rinse it well. Remeasure its thickness.
3. Measure the advancing and receding contact angles using the monolayer that was immersed in thiol solution for at least a week. To do this, form a water drop at the end of the needle. Next, bring the drop in contact with the surface. Add a small amount of water to expand the drop. Immediately take a “snapshot” of the contact angle. Use the software to figure the contact angle of the drop. To measure the receding contact angle, suck a small amount of water from the drop and immediately take a snapshot. Use the computer to figure the contact angle.
4. With the monolayer that you prepared today, utilize the various hydrocarbons that you employed in laboratory 3 in an effort to determine surface energy. Is this energy higher or lower than for the monolayer in laboratory 3? Why?
5. Using the monolayer you prepared today, measure the advancing and receding water contact angles. Are the overall contact angles higher or lower than with the more organized monolayer? What about the hysteresis?