



BME 332
Biomaterials and Biomechanics Lab

Lab 1
Surface Energy, Contact Angle and
Young's Equation

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Purpose

- The aim of this experiment is to understand the hydrophobicity/hydrophilicity properties of different material surfaces by measuring the contact angle.
- Contact angle is conventionally measured through the liquid, where a liquid/vapor interface meets a solid surface.

Theory

- Contact angle analysis is often used to provide overall information about the hydrophobicity of a surface. The surface free energy or surface tension (γ) of a material can be defined thermodynamically as the work of making a unit area of a new surface.

Young's Equation

$$\gamma_{SV} = \gamma_{SL} + \gamma_{LV} \cos \theta$$

by accurately measuring the angle between the drop and the solid surface (**the contact angle, θ**), the surface tension can be calculated using Young's equation.

Methods

- Liquid will be dribbled on the surface. Then the droplet on the surfaces will be photographed sideways.
- The angle between the droplet and surface will be measured using the Image J Program. You can download Image J from <http://imagej.nih.gov/ij/>.
- This procedure will be repeated for each of the 9 different surfaces.
- Compare the data you get graphically considering the Young's Equation.
- Comment on the surface properties.

References

- Biomaterials: The Intersection of Biology and Materials Science, Temenoff, Mikos, Pearson Prentice Hall, 2008
- Yuehua Yuan and T. Randall Lee, Contact Angle and Wetting Properties, Chapter 1, Surface Science Techniques, Springer Series in Surface Sciences