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Differential pressure experiment to probe adhesive interactions in thin films ANNY FLORY, DAVID BRASS, KENNETH SHULL, Department of Materials Science and Engineering, Northwestern University — In our laboratory we have developed a highly sensitive experiment which allows the measurement of very weak adhesive interactions between interfaces joined together by specific bonds. In the experiment, we place a membrane across a glass tube and use a syringe pump to apply a pressure difference across the membrane. The membrane is then inflated into contact with a glass substrate or the quartz disk of a quartz crystal resonator that is functionalized as desired and is immersed in an aqueous environment. A Langmuir layer is placed at the interface between air and water providing the modification of the surface chemistry of the membrane. The asymmetric Laplace equation is used to derive the energy release rate (G) from the experimental results. The advantage of this method is that specific and weak adhesive interactions as the ones encountered in biological systems can be accessed but also that the approach can be extended to measurement of very strong adhesive interactions such as those in synthetic gels. In this discussion, the validity of the method will be presented through results obtained on adhesive interactions between various model systems.

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