Cantilever-Based Optical Interfacial Force Microscope
U.S. Patents Pending – 12/757,542 and 13/286,059
BSU File Reference #57/87

Abstract
Traditional microscope systems are generally unable to measure intermolecular interactions accurately and cost effectively. One type of microscope system is the atomic force microscope (AFM), which has been used to image and/or measure the topography of various surfaces. AFM’s, however, suffer from a mechanical instability that prevents the accurate measurement of intermolecular interactions. Another type of microscope system is the interfacial force microscope (IFM). Traditional IFM’s use an electrical detection process to measure various surface phenomena. IFM’s, however, have not been widely used due to the low sensitivity and technical complexity of their electrical detection process. Thus, traditional microscope systems have generally been unable to measure intermolecular interactions accurately and cost effectively.

Boise State University has developed a cantilever based optical interfacial force microscope (COIFM) that utilizes a microactuated silicon cantilever and optical detection method to establish the measurement of single molecular interactions using the force feedback technique. The COIFM can measure single molecular interactions and bridges the gap between AFM and IFM based protocols.

Advantages
- COIFM overcomes the persistent mechanical instability of the cantilever assembly near a sample surface in traditional AFM; the COIFM force-feedback technique prevents tip from snapping off.
- COIFM improves sensitivity by employing an optical detection scheme. The conventional IFM system is noisier due to its electrical detection scheme. The COIFM laser-and-position-sensor detector responds with greater precision.
- COIFM improves spatial resolution by using a cantilever-based probe with a nanometer scale diameter.
- COIFM achieves easier and more reliable force balance than the traditional magnetic force based balancing scheme.
- COIFM can be added to existing equipment.

Boise State is looking for a Licensee for this technology.

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