

Reliable Method for the Calibration of Optical Cantilever Deflection Detection Systems

Zhiyu Hu¹*, Tim Seeley², Sebastian Kossek² and Thomas G. Thundat¹

¹ Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831-6123

² Protiveris, Inc., Rockville, Maryland 20850

Abstract

Because of its ultra-high sensitivity, the optical lever detection method similar to that used in the Atomic Force Microscope (AFM) has been widely employed as a standard technique for measuring microcantilever deflection. Recently, with the increasing interest of using the microcantilever as a sensing platform there is a requirement for a reliable calibration technique. Many researchers have borrowed the concept of the optical lever detection system to construct microcantilever deflection readout units for chemical, physical and biological detection. However, without an AFM piezo scanner, it is very difficult to precisely calibrate the performance of the optical lever detection system. Here we present a step-by-step method to conveniently calibrate the system using commercially available piezoresistance cantilevers. The experimental results show a close match to the theoretical calculation. Following the optimized procedure, one can easily calibrate any optical cantilever deflection detection system with very high repeatability and precision and reliability.

* Corresponding author: zhi@ornl.gov

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