An Astigmatic Detection System for Polymeric Cantilever-based Sensors

We demonstrate the use of an astigmatic detection system (ADS) for resonance frequency identification of polymer microcantilever sensors. The ADS technology is based on a DVD optical head combined with an optical microscope (OM). The optical head has a signal bandwidth of 80 MHz, allowing thermal fluctuation measurements on cantilever beams with a subnanometer resolution. Furthermore, an external excitation can intensify the resonance amplitude, enhancing the signal-to-noise ratio. The full width at half maximum (FWHM) of the laser spot is 568 nm, which facilitates read-out on potentially submicrometer-sized cantilevers. The resonant frequency of SU-8 microcantilevers is measured by both thermal fluctuation and excited vibration measurement modes of the ADS.

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