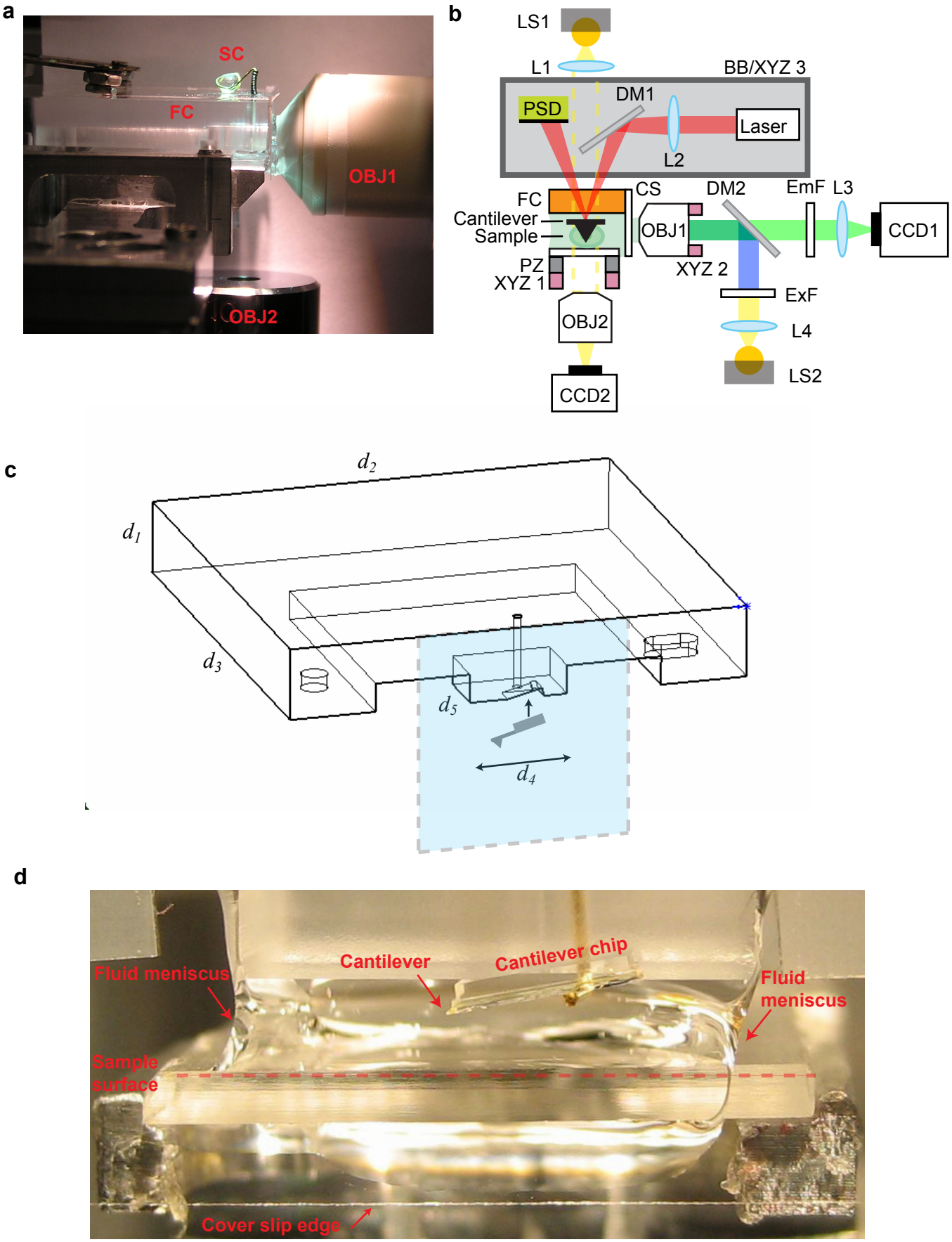
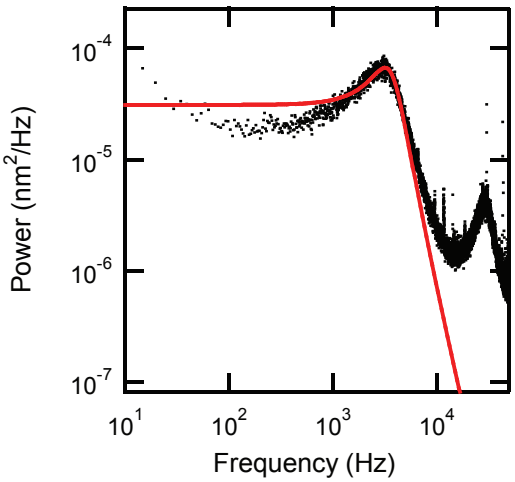
Supplementary Figure 1



Supplementary Figure 1 | Side-view AFM design and setup. (**a**) Photograph of side-view imaging path. The sideview objective (OBJ 1) is positioned next to a coverslip (CS), which serves as an imaging interface and is attached to the Fluid Cell (FC). A spring clip (SC) can be seen that holds the cantilever rigidly to the fluid cell. The bottom-view objective can also be seen from this view (OBJ 2). (**b**) Schematic of instrument setup – specific component part number, supplier, and specifications are described in the **Online Methods** section. Labels for parts are as follows: LS – lightsource, L – lenses, BB – breadboard, XYZ – XYZ translation stage, FC – fluid cell, OBJ – microscope objective, DM – dichroic mirror, EmF – emission filter, ExF – Excitation filter, CCD – camera, PZ – piezoelectric stage, PSD – position sensitive diode. (**c**) Design of glass fluid cell (shown in orange in **a**) that holds the cantilever as indicated. Coverslip (cartooned in light blue) is attached to the fluid cell. Marked distances are: d_1 = 6.35 mm, d_2 = 40.6 mm, d_3 = 40.6 mm, d_4 = 5.1 mm, and d_5 = 8.6 mm. (**d**) Close-up photograph of the fluid cell holding the cantilever close to the surface immersed in fluid is shown, and is shown from the sideview objective's perspective. The edge of the coverslip, which serves as the imaging interface, can be seen. Fluid immersing the cantilever wicks onto the coverslip resulting in a flat imaging interface, and the fluid meniscus can be seen. The sample surface (coverglass) can be seen and is indicated by the red dotted line. The cantilever chip is seen here positioned at an angle of 10^o relative to the sample surface, and the position of the cantilever sticking out from the chip is indicated with the arrow, though it cannot be seen at this magnification.

Supplementary Figure 2



Supplementary Figure 2 | Cantilever power spectrum showing thermally-limited detection of cantilever position. The power spectrum of the cantilever in water is shown in black, and the best fit of a Lorentzian function to the 1st resonance of the power spectrum is shown in red. The calculated spring constant based on this fit was 17 pN/nm, which is close to the manufacturer's specified value of 20 pN/nm.