

Using Nanomechanics to Explore Biological Function

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The premise which underpins nanotechnology and biotechnology is that we have the ability to understand, manipulate and utilize the function of molecules and small volumes of material at the nanoscale. Scanning probe microscopy has enabled the measurement of structure on this scale for over two decades however it is clear that a concerted shift in emphasis is needed, from measuring structure to that of understanding function.

The main challenges facing us in understanding the function of biological systems are the inherent complexity involved in these systems and the sophisticated interplay they often have with their local aqueous environment. To better understand biological systems we have developed an atomic force microscope capable of operating at the theoretical noise limit and apply the sensitive and quantitative frequency modulation detecting technique in the liquid environment. This enables us to obtain Ångstrom scale lateral imaging resolution combined with detailed interaction profiles which indicate the influence of water and ions in the near surface region.