Effect of electrostatic interactions on DNA melting observed using microcantilevers SIBANI BISWAL, UC Berkeley, HENRYK BIRECKI, Hewlett-Packard Laboratory, ALISON CHAIKEN, Hewlett-Packard Laboratory, ARUN MAJUMDAR, UC Berkeley — Mechanical detection for biochemical reactions through the use of microcantilevers is an emerging technique that can be used to measure the biophysical properties of macromolecules. By optically monitoring the bending of micocantilevers, we can measure the surface stress exerted on the cantilever as a DNA complex undergoes melting. With the microcantilevers, we are able to explore the stability of DNA under a variety of solution conditions. Differences in the lengths and intermolecular interactions between single and double stranded DNA are highlighted by variations in cantilever deflection. Additional parameters such as long-range electrostatic interactions between nucleic acids and ions affect the surface stress on a cantilever. Higher monovalent ion concentrations screen this interaction which results in higher stability of DNA. In our study, we evaluate the stability of short linear DNA complexes from 10-20 nucleotides at varying salt concentrations. We show that this technique is a useful probe of DNA melting dynamics, which allows us to better understand the stability of DNA complexes.

Reference: