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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.[1] 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:

1. Wu, et al. "Origin of Nanomechanical Cantilever Motion Generated from Biomolecular Interactions," Proc. National Acad. Science, Vol. 98, pp. 1560-1564 (2001).

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