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Using a Microcantilever Array for Detecting DNA Melting SIBANI BISWAL, UC Berkeley, DIGVIJAY RAORANE, UC Berkeley, ALISON CHAIKEN, HP Labs, ARUN MAJUMDAR, UC Berkeley — Microcantilever based sensors translate changes in Gibbs free energy due to macromolecular interactions into mechanical responses. We utilize the microcantilevers to observe surface stress changes in response to thermal dehybridization of surface grafted double stranded DNA oligonicleotides. We begin by immobilizing and hybridizing 20, 25, and 30 base pair DNA strands. Once the cantilever is heated, the DNA undergoes a transition as the complementary strand melts which results a cantilever deflection change. This deflection is due to changes to the electrostatic, ionic, and hydration interaction forces between the remaining immobilized DNA strands. For example, using a 20mer DNA strand in a 50 mM PBS buffer, the cantilever deflection shows an abrupt discontinuity at T $\sim 39^o$C. When the salt concentration is lowered to 25 mM, we see a shift in the discontinuity to a lower temperature, T $\sim 30^o$C. We also observe that DNA strands grafted onto the cantilever melt at lower temperatures compared to bulk solution due to the interactions between neighboring strands and the surface. We are also probing how base mismatches affect the cantilever deflection. This new technique has allowed us to probe DNA melting dynamics and leads to a better understanding of the stability of DNA complexes on surfaces.

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