Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Development of High-Resolution Magnetic Tweezers for Single-Molecule Measurements KIPOM KIM, Materials Department, University of California Santa Barbara, OMAR A. SALEH, Materials Department and BMSE Program, University of California Santa Barbara — Magnetic tweezers can sense single-molecule DNA-protein interactions through optical tracking of the motion of a colloidal particle. This is typically done by relating changes in the colloid's diffraction pattern to its position. While diffraction-tracking is relatively simple to implement, it is intrinsically limited in its resolution. To improve this, we have developed a tracking technique based on Reflection Interference Contrast Microscopy (RICM). RICM relies on interference between light reflected from the colloid and a glass surface. To optimize the interference pattern, the reflecting surfaces of the colloid and the glass substrate were coated with gold and dielectric thin-films, respectively. To maintain the focal position of objective against the defocusing due to a thermal drift, the objective was automatically focused on the glass/water interface using feedback control with a piezo-driven actuator. We evaluated the system's performance by measuring fundamental physical properties of the DNA.

Kipom Kim
Materials Department, University of California Santa Barbara

Date submitted: 18 Nov 2006 Electronic form version 1.4