

Abstract Submitted  
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**Horizontal Magnetic Tweezers for Micromanipulation of Single DNA-Protein Complexes** C. MCANDREW, Catholic University, A. SARKAR, P. MEHL, CUA — We report on the development of a new magnetic force transducer or “tweezer” that can apply pico-Newton forces on single DNA molecules in the focus plane. Since the changes in DNA’s end-to-end extension are coplanar with the pulling force, there is no need to continually refocus. The DNA constructs ( $\lambda$ -DNA end labeled with a  $3\mu\text{m}$  polystyrene bead and a  $2.8\mu\text{m}$  paramagnetic sphere) and appropriate buffer are introduced to a custom built  $400\mu\text{L}$  to  $650\mu\text{L}$  closed cell. This closed cell isolates our sample and produces low-noise force and extension measurements. This chamber rests on a stage fixed to a three axis micromanipulator. Entering the flat chamber are two micropipettes, a  $2.5\mu\text{m}$  id pipette for aspirating the polystyrene bead and a  $20\mu\text{m}$  id pipette for injecting proteins of interest. The suction and the injection pipettes are rigidly mounted to a hydraulic, three-axis micromanipulator. DNA-bead constructs, once introduced to the chamber, can be located by moving the stage over the objective. We have shown that we can easily and reputedly find, capture, and manipulate single molecules of DNA within a force range of  $0.1\text{pN}$  to  $100\text{pN}$ .

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