

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

A Technique for Estimating the Surface Conductivity of Single Molecules¹ HAIM BAU, MARK ARSENAULT, HUI ZHAO, PRASHANT PUROHIT, YALE GOLDMAN, University of Pennsylvania — When an AC electric field at 2MHz was applied across a small gap between two metal electrodes elevated above a surface, rhodamine-phalloidin-labeled actin filaments were attracted to the gap and became suspended between the two electrodes. The variance of each filament's horizontal, lateral displacement was measured as a function of electric field intensity and position along the filament. The variance significantly decreased as the electric field intensity increased. Hypothesizing that the electric field induces electroosmotic flow around the filament that, in turn, induces drag on the filament, which appears as effective tension, we estimated the tension using a linear, Brownian dynamic model. Based on the tension, we estimated the filament's surface conductivity. Our experimental method provides a novel means for trapping and manipulating biological filaments and for probing the surface conductance and mechanical properties of single polymers.

¹We acknowledge partial support from the National Science Foundation through the Nano/Bio Interface Center (NSF NSEC DMR-0425780).

Haim Bau
University of Pennsylvania

Date submitted: 31 Jul 2007

Electronic form version 1.4