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High Throughput Magnetic Force System for Experiments in Polymer and Biological Physics¹ RICHARD SPERO, LEANDRA VICCI, JEREMY CRIBB, VINAY SWAMINATHAN, R. SUPERFINE, University of North Carolina at Chapel Hill — While technologies for micro- and nano-scale manipulation have expanded the fields of nano-mechanical and biophysical experimentation, these manipulation techniques are typically low-throughput. Techniques using microbeads (particles $\sim 0.1 - 10\mu m$) show promise for enabling high throughput mechanical measurements of these systems. We demonstrate instrumentation to magnetically drive microbeads in a biocompatible, multi-well magnetic force system. It is based on commercial high throughput screening standards, and is scalable to 96 wells. The rheology of polymers and biomaterials can be studied, and cells can be cultured, in this Magnetic High Throughput System (MHTS). The MHTS can apply independently controlled forces to 16 specimen wells. Force calibrations demonstrate forces in excess of 1nN, predicted force saturation as a function of pole material, and powerlaw dependence of $F \sim r^{-2.7 \pm 0.1}$. We also report our recent results in applying the MHTS to measure rheology of fibrin clots and cell mechanics.

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