

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Sorting Category: 10.6 (E)

Micromachined piconewton force sensor for biophysics investigations¹ STEVEN KOCH, GAYLE THAYER, ALEX CORWIN, GEORGE BACHAND, MAARTEN DE BOER, Sandia National Laboratories — We describe a polysilicon surface-micromachined force sensor that is able to measure forces as small as a few pN in both air and water. The simple device consists of compliant springs with force constants as low as 0.3 mN/m and Moire patterns for nanometer-scale optical displacement measurement. First, we measured the force field produced by an electromagnet on individual 2.8 micron magnetic beads glued to the force sensor. Forces matched predictions from finite element magnetic modeling and provided a calibration for future biophysical applications of the magnet. By repeating with several different beads, we measured a 9 percent standard deviation in saturation magnetization. We also demonstrated that the force sensor was fully functional when immersed in aqueous buffer and when performing the kinesin inverted motility assay on the sensor surfaces. These results show the force sensors can be useful for calibrating magnetic forces on magnetic beads and also for direct measurement of biophysical forces on-chip.

¹Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94AL85000

Prefer Oral Session
 Prefer Poster Session

Steven Koch
sjkoch@sandia.gov
Sandia National Laboratories

Date submitted: 05 Dec 2005

Electronic form version 1.4