Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Interlayer forces in telescoping nanotubes ANDRAS KIS, KENNETH JENSEN, University of California, Berkeley, SHAUL ALONI, Materials Sciences Division, Lawrence Berkeley National Laboratory, WILLIAM MICKELSON, ALEX ZETTL, University of California, Berkeley — The ability to fabricate low-friction surfaces and lubricants is one of the key requirements for the miniaturization of mechanical systems, especially on the nanoscale where friction and surface adhesion often dominate over gravity and even electrostatic attraction. In this context, multiwalled carbon nanotubes (MWNT) have been proposed as the ideal nanobearing because of their inert, ultra-smooth surfaces and the narrow separation between their neighboring shells that prevents the accumulation of contaminant particles between sliding parts. In analogy with graphite, the weak van der Waals interaction between nanotube shells could provide the equivalent of lubrication, allowing easy relative sliding of nanotube layers. We have externally induced telescoping motion in MWNTs while measuring the force acting between the two layers involved in this motion. The restoring van der Waals force is comparable with theoretically predicted values. Defects are found to modulate this force and can lead to jamming.

Andras Kis
University of California, Berkeley

Date submitted: 15 Jan 2006 Electronic form version 1.4