chemisch
physikalische
gesellschaft

Gegründet im Jahre 1869 von H. Hlasiwetz,
J. Loschmidt, J. Petzval und J. Stefan

EINLADUNG

zum Vortrag
von

Prof. Dr. Boris I. Yakobson

Dept. of Mechanical Engineering & Materials Science
Rice University, Houston, Texas, USA

über

Nanomechanics of carbon tubules: Ten years after

am
Dienstag, 11. März 2008, um 17.30 Uhr

Ort: Großer Hörsaal der Experimentalphysik, Universität Wien,
1090 Wien, Strudlhofgasse 4 / Boltzmanngasse 5, 1. Stock

Abstract:
A decade ago, observations of bent yet not broken nanotubes (NT) have ignited interest in their extraordinary mechanics. Naïve expectations of super-strong materials have now grown into detailed knowledge of atomistic relaxation, of different responses and defects. Two NT-related phenomena will be discussed: One occurs at very hot 2000°C, another takes place upon minor yet biologically significant warming by just 10-50°C.

Spectacular experiments have confirmed our early predictions of plastic flow, yet also revealed new intriguing features of superplasticity. Now we appreciate how the glide of pentagon-heptagon defects and a particular type of their pseudo-climb [F. Ding, *et al.*, Phys. Rev. Lett. **98**, 075503 (2007); Nano Lett. **7**, 681 (2007)], act concurrently to maintain the tube perfection, even in spite of great mass loss at sublimation conditions [J. Huang, *et al.*, Phys. Rev. Lett. **99**, 175503 (2007); Phys. Rev. Lett. **100**, 035503 (2008)]. These dynamics also assist the constructive technologies of welding and plastic transformations.

Recently, our medical colleagues have discovered the ability of NT to release heat in a radio-frequency (RF) electromagnetic field [S. Curley, *et al.*, Cancer **110**, 2654 (2007)]. While they succeed in inducing hyperthermia and killing cancer cells and tumors, the compelling physics behind such efficient power deposition is under investigation. One working hypothesis allows us to reconcile the high heating rates with low NT concentrations in aqueous solutions.