Professor H. Daniel Wagner

Composite Materials Mechanics
Weizmann Institute of Science

See:
http://www.weizmann.ac.il/materials/Wagner/

Capsule Bio:

Born in Israel, Daniel Wagner grew up in Brussels, Belgium, where he earned a License in Physics from the Free University of Brussels (1975). He was awarded a MSc degree in Materials Science from the Hebrew University of Jerusalem (1977) and completed a PhD there in 1983. He spent three years at Cornell University as a postdoctoral associate and lecturer. Daniel joined the Weizmann Institute's Department of Materials Research (now the Department of Materials and Interfaces) in 1986. Daniel was the recipient of the Gutwirth Prize in 2010, and was the elected Chairman of the Gordon Research Conference on Composites in 2000. He also won the Fiber Society Award for Distinguished Achievement in 1991, and the Somach-Sachs Prize in Chemistry in 1990. He holds the Livio Norzi Professorial Chair in Materials Science. His hobbies include genealogy, literature, jazz, and soccer.

Professor Wagner writes:

Research in my team focuses on several related themes: The interfacial adhesion and fracture physics in polymer composites (micromechanics and nanomechanics); the nanomechanics of carbon and non-carbon nanotubes and nanocomposite materials; the stress-sensing potential of carbon nanotubes in polymer matrices; and the relationship between (micro, nano) structure and mechanics in biological composites.

The main emphasis and common thread between the various projects is the uncovering of phenomenological and mechanical similarities between apparently different materials families possessing common fibrous characteristics. A secondary focus is on two-dimensional microstructures - surfaces, interfaces, and interphases – which have a profound influence on the physics and mechanics (stress transfer, deformation, fracture) of fibrous composites of any kind, synthetic and natural.

Applications for synthetic composites range from re-entry heat shields for spacecraft, new aircraft designs (such as the Airbus 380 and Boeing 787), fishing rods, tennis racquets, bicycle frames and racing car bodies, solar panel substrates, and orbital telescopes.

Being extremely intricate, biological composites have the potential to inspire radically new synthetic composite designs, for example in the field of ballistic impact-resistant structures.

Selected Publications:

O. Lourie, D. M. Cox, and H. D. Wagner, **Buckling and collapse of embedded carbon nanotubes**, Phys. Rev. Lett., 81 (1998) 1638–1641

Lourie, O.; Wagner, H. D. J. Mater. Res. 1998, 13, 2418-2422

O. Lourie and H. Wagner, J. Mater. Res. 13, 1471 __1998__

J. R. Wood, M. D. Frogley, E. R. Meurs, A. D. Prins, T. Peijs, D. J. Dunstan, and H. D. Wagner, J. Phys. Chem. B 103, 10388 __1999__.