

Joint CQSE and CASTS Seminar

Weekly Seminar
Apr. 6, 2017 (Thursday)

TIME Apr. 6, 2017, 12:30 ~ 13:30
TITLE Cartilage: The Remarkable Mechanical Properties of a Soft Squishy Tissue
SPEAKER Prof. Itai Cohen
Department of Physics, Cornell University
PLACE Rm104, CCMS & New Physics Building, NTU

Abstract

Who among us has not spent countless hours squeezing, rubbing, and smushing gooey tissues like, cartilage between our fingers? If we could magnify our view and look deep within the substances we are handling what structures would we find? How do molecules interact synergistically to enable lubrication? How, do these structures and interactions lead to the important mechanical properties that allow this tissue to protect our bones? In this talk, I will discuss how we are using custom built mechanical deformation devices in combination with confocal microscopy to determine the local mechanical properties of articular cartilage. I will describe our recent work on looking at the synergistic interactions between lubricating molecules at the cartilage surface. Further, I will show that the shear modulus of cartilage varies by orders of magnitude near the surface and that this variation enables this tissue to localize strains near its surface and protect the underlying bone from shear deformation and rapid impacts. Finally, I will describe a new model we have proposed that suggests these properties arise from the proximity of the collagen network in articular cartilage to a percolation threshold.

