

SPRING 2007 SEMINAR SERIES

Date: Wednesday, May 16, 2007

Time: 10:15 am – 11:15 am

Room: SL 165

Everyone is invited

**Microdamages: An Insight to Understanding the
Mechanical Performance of Materials**

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Material failure is progressive and complex in nature. It involves initiation, progression, accumulation of microdamages. These damages consist of re-distribution of dislocations initially, microvoids formation, and other heterogeneities present even in materials appeared to be homogeneous. An idealized pre-existing crack or notch to intensify the applied stress is not sufficient to understand the mechanical behavior of materials. Current technologies suffer limitations of indirect measurements, insufficient resolution, and non-quantitative evaluation of microdamages.

This presentation will report a technique developed by the author's group. The presentation outline is: 1) Introduction; 2) Tools and Methods; 3) Projects; and 4) Research Proposals. In Introduction, the motivation, the nature and the significance of microdamage are presented. In Tools and Methods, current theoretical and experimental approaches, and the techniques used by the author are illustrated. In Projects, a technique validation, its application to investigate fatigue performance of cemented total hip arthroplasty, and the application to broader area of material engineering are reported. The projects in progress are also briefed. The emphases, finally, are to use the pilot data and technique seeking broader collaboration in both clinical and material science/engineering areas.