

Probing Mechanical Deformation and Failure via Synchrotron X-rays

(Apurva Mehta, SSRL, and Nobumichi Tamura, ALS)

This workshop will involve scientists interested in investigating mechanical properties of materials via synchrotrons. Sessions would discuss salient issues in mechanical deformation and failures, such as crystal plasticity models, fatigue, crack propagation, etc. A brief survey of relevant synchrotron methods - parallel beam geometry for mesodiffraction, microdiffraction, and phase contrast imaging, and talks on actual experiments done at synchrotrons would also be included. At the end of the day, we plan to brain-storm future projects and developments.

Program:

Session I:

8:45 am: Introduction – [Apurva Mehta](#)

9:00 am: Introduction to Microdiffraction – [Nobumichi Tamura](#)

9:45 am: coffee break

Session II: (chair – Bill Nix)

10:00 am: Nanoindentation and Nanomechanics – [Erica Lilleoden](#)

10:45 am: An Introduction to Strain Gradient Plasticity: Theory and Experiment – [James Stolken](#)

11:30 am: Microdiffraction Analysis of Strain Gradient Plasticity Theories – [Monica Barney](#)

12:00 pm: lunch

Session III: (chair – Brad Boyce)

1:00 pm: Length Scale Effects on Mechanical Properties of Crystalline Materials – [Bill Nix](#)

1:45 pm: Modeling Microstructural Deformation and Failure Processes at a Crack Tip – [Don Shockey](#)

2:30 pm: Visualization of Cracks and Crack propagation – [Zofia Rek](#)

3:15 p.m.: coffee break

Session IV : (chair – Nobu Tamura)

3:30 pm: Spatially Resolved Residual Stress Measurements for Insight into Turbine Engine Fatigue Failures – [Brad Boyce](#)

4:15 pm: X-Ray microdiffraction on diamond shaped NiTi for Biomedical Applications – [Valentina Imbeni](#)

5:00pm: Discussion of future experiments.