

GRADUATE MATERIALS SOCIETY NEWSLETTER

ISSUE 2, SPRING

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

FEB 04 2008

NEW EQUIPMENTS OVERVIEW

Dear Students & Faculty,

[RHK UHV Scanning Probe
Microscope](#)

In this month's edition of the GMS newsletter we wanted to introduce you to several new pieces of equipment that the department has acquired over the past several months which many of you may not be familiar with. Each of these instruments are briefly highlighted below along with a reference for those that would like more information.

A recent addition to the Swagelok Center for Surface Analysis of Materials is the RHK Ultra High Vacuum Scanning Probe Microscope. Dr. Frank Ernst introduced the remarkable capabilities and potential applications of this system during last semester's colloquium. Of particular interest is the ability to prepare specimens for analysis in-situ through the use of a



RHK UHV Scanning Probe Microscope

preparation chamber adjacent to the primary chamber. The system is capable of SPM analysis within a multitude of environments and over a temperature range of 25-1500 K with near atomic scale resolution.

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SEMINAR OF THIS MONTH

Feb 05 **George T. (Rusty) Gray III**, Los Alamos National Laboratory

“Bridging the Experimental-Modeling Gap to Support the Development of Predictive Capability in Constitutive, Damage Evolution and Fracture”

Feb 12 **Greg Morscher**, Ohio Aerospace Institute/NASA Glenn Research Center

“Advanced Woven SiC/SiC Composites for High Temperature Application”

Feb 19 **Mike Readey**, Caterpillar Inc.

“The Role of Materials in the Quest for Cleaner Air”

Feb 26 **William W. Gerberich**, University of Minnesota

“Understanding the Fracture Toughness of Semiconductors and Ceramics”

Happy Hour

Friday 5 p.m. UG Lounge

Feb 08 Prof Heuer

Feb 15 Prof Lewandowski

Feb 22 Prof Cawley

Feb 29 Prof Michal

Materials Lunch

Friday Noon UG Lounge

Feb 08 Lisa & Ken

Feb 15 Patsy Harris

Feb 22 Susan

Feb 29 Gu & Zhu & Li

GMS UPDATES

- *Please sign up for April's Materials Lunch !!!*
- *You can update your door tag or have your photo taken for the bulletin board by contacting Man-I at mil4@case.edu*

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BUEHLER VIBROMET POLISHING SYSTEM

A more complete description of the RHK UHV Scanning Probe Microscope and its capabilities can be found at: <http://dmseg5.case.edu/Groups/Ernst/SCSAM/rhk7500.html>

Buehler Vibromet Polishing System

The new vibratory polishing system made by Buehler

is located in White 509. The Vibromet 2 is capable of polishing most metals including soft alloys, super alloys, and solid state devices. The system utilizes a variable amplitude vibration mechanism to achieve nearly 100 % horizontal vibratory motion with near 0 % vertical motion resulting in excellent surface finishes without inducing unwanted deformation.

Inquiries regarding the Vibromet polishing system can be directed to Dr. Reza Shaghi at rxs270@case.edu.



Buehler Vibromet Polishing System

XEDS & EBSP ADDITIONS TO THE FIB

The Nova Nanolab 200 Focused Ion Beam System recently has received two very valuable upgrades, XEDS and EBSP systems.

The new EBSP system, made by HKL Technologies, utilizes crystallographic analysis to obtain quantitative and qualitative information such as grain size, grain boundary character, grain orientation, texture, and

phase identity. This unit replaces an old EBSP system which was capable of processing only one image per second in comparison to roughly 70 images per second on the new HKL system. Thanks to these increases in imaging capabilities, the system can also be used to regenerate a structure based on the results of crystallographic analysis.

The new state-of-the-art XEDS XFlash® detector 4010 EDS system, made by Bruker, is capable of very high acquisition speeds. At its highest throughput, the Bruker system is capable of 275,000 cps in comparison to the old system's 10,000 cps. This immense leap in acquisition speed allows for many new analysis capabilities including quantitative chemical mapping within the

FIB.

Inquiries regarding the new additions to the FIB can be directed to Dr. Amir Avishai at axa189@case.edu.



CETR Universal Micro Tribometer

CETR UNIVERSAL MICRO TRIBOMETER (UMT)

The UMT, made by CETR Inc, brings additional tribology and wear research capabilities to the department. This instrument is capable of characterizing wear behavior, micro hardness, and lubricant performance. The UMT is currently equipped to conduct standard reciprocating and rotational Pin-On-Disk (POD) tests with a normal force range of 1-1,000 kg and a vertical position resolution of 0.1 microns.

The UMT can simultaneously measure wear depth and coefficient of friction to characterize wear and frictional behavior in a variety of different environments up to 350 °C. The UMT can also be used in more application specific test configurations such as the four ball test and block on ring test.

Inquiries regarding the UMT can be directed to Lucas O'Donnell at

lucas.odonnell@case.edu.

The addition of these impressive instruments to Case DMSE's exceptional facilities is yet another example of why the department remains a leader in the materials research community year after year.

Lucas O'Donnell
GMS