Northwestern University Atomic and Nanoscale Characterization Experimental (NUANCE) Center

Vinayak P. Dravid
Professor, Materials Science & Engineering Director, NUANCE Center Northwestern University, Evanston, IL

http://www.nuance.northwestern.edu

Silicon Atoms Along [110]
NU Atomic and Nanoscale Characterization Experimental (NUANCE) Center:
www.nuance.northwestern.edu

(East Corridor Cook Hall, Silverman Hall)

NIFTI
(Nanoscale Integrated Fabrication, Testing and Instrumentation)

EPIC
(Electron Probe Instrumentation Center)

Keck-II
(Keck Interdisciplinary Surface Science)

Testing and Instrumentation)
AFMs/DPN
NSOM/f-s Laser
Nano-indentor
E-beam litho

Dr. G. Shekhawat
Dr. Mirela Mustata (PD)

AEM: Drs. Shuyou Li, 1 PD
SEM: Ben Myers, Eric Miller
TEM: Dr. Jinsong Wu
Cryo-/Bio/Soft: Reiner Bleher, Eric Roth

Dr. Xinqi Chen

Business Manager: Jasmine Walker

Program Assistant: Mary Pat Doyle

Exploring the Inner Space
NUANCE: Facts and Figures

- Over 20 major instruments, > $15 Million
  - Electron/ion/light microscopy, scanning probe & surface science
- 8 technical staff (7 PhDs, 1 MS (PhD), 1 BS), 1 Business manager and 1 program assistant
- > 110+ faculty affiliate users
- > 630+ student/postdoc users
- > Several dozen industries and IL colleges

Instrumentation acquisitions supported by:
NSF-MRI, NSF-IMR, NU NSEC through State of IL, Keck Foundation, NU
Some features of FOM
- Easy-to-use user interface
- EVERYTHING online
  New user application, Reservation, Logon/Logoff, Activity reports, Billing
  Equip administration, user management
- Control hardware switches from internet
- 8hr user and 24 hr user control
- Embedded email listserv to various groups of users
- Embedded inventory management online
- Embedded safety/manual documentations
- Reports for Advisors
- Various statistic reports for facility administrator
- Support multiple facilities with the same SQL server
- http://www.fom.northwestern.edu/
Access control and data sharing with FOM®

- Remote reservation of beam time
- Reliable access control
- Data sharing and security
- Cyber-collaboratory
- Billing and invoice tracking
NUANCE Center

Exploring the *Inner* Space
Demo of FOM® and access

Dr. Shuyou Li
*Chief Architect FOM*

Manager, SPF-TEM/EPIC
NUANCE Center
Access control & data sharing with FOM®

Scheduling

Access Control

Service tracking and data share

Billing & invoice tracking

NUANCE Center

Exploring the *Inner* Space
FOM® CONNECTIVITY

User’s PC
Any PC/access connected to the internet.
Software required: None!

FOM Server
Any server CPU
Software required:
• Microsoft Server 2003 or up
• Microsoft SQL2000 up
• Apache Tomcat
• FOM package

Optional Access Control Box
No PC required

Instrument # 1
No PC required

Instrument # 2
No PC required

Instrument # 3
No PC required

Instrument # unlimited
No PC required

NUANCE Center
Exploring the *Inner* Space
Remote reservation of beam time

Notes from instrument manager

- TEM JEOL 2100F is now Down
- Reservation Limits: No later than 21 days; New reservations open hour by hour.
- Your user level on this instrument is: Instrument Manager.

Instrument Schedule: TEM JEOL 2100F

[Image of the instrument schedule interface with details like Express Logon, Previous user comment, and a calendar view for reservations.]
Access Control with remote switch

- FOM Central Server
  - Communicate via Internet
  - Any server CPU
  - Software required:
    - Microsoft Server 2003 or up
    - Microsoft SQL2000 up
    - Apache Tomcat
    - FOM package

- FOM Access Control Box
  - Control power supply or signal line
  - No PC required

- Instrument 1
  - No PC required

- Instrument 2
  - No PC required

Front view

Rear view
FOM®: Diverse benefits for varied stakeholders

- **University Office for Research**
  - Unified management of all shared facilities across the campus

- **University Accounting Department**
  - Easier billing process
  - Accurate billing journals on shared facility use. No more bounce-backs, no more hassle.

- **Principal Investigators**
  - Accurate reports of group activities on shared facility use
  - Solid research expense estimate for funding proposals

- **Center Directors**
  - Customized reports on shared facility use by departments, supervisors, etc.
  - Accurate reports on instrument down time and repair history

- **Instrument Manager**
  - Easier communication with various group of users
  - Streamlined user authorization and management process
  - Extremely flexible instrument use and charge policy
  - Track instrument usage records, repair history, consumable inventory, collaboration and service records. Upload/download results by collaborators

- **Student User**
  - Single login to find all available facilities on campus. No need to ask around
  - Schedule instrument use with any internet connected computer
Collaboration tracking and data sharing
TEM SERVICE REQUEST FORM

NUANCE Center, Northwestern University, Cook Hall #1154, 2220 Campus Drive, Evanston, IL 60208
Contacts: Dr. Jinsong Wu, 1-847-491-7807, jinsong-wu@northwestern.edu; Dr. Shuyou Li, 1-847-491-6723, syli@northwestern.edu

PROJECT INFORMATION

Project ID: TEM_Service Date: 10/30/2011

USER INFORMATION

Name: Shuyou Li Phone Number: 1-6723 Email: syli@northwestern.edu
Advisor: NUANCE Staff Account Number: 4735000-30009506
Address:

SAMPLE INFORMATION

Sample Name: Number of Samples:

Sample Dimension (Must check at least one): □ Bulk hard material □ Bulk soft material □ Micron scale (100nm-1000nm) powder □ Micron scale suspension □ Nano scale (1nm-100nm) powder □ Nano scale (1nm-100nm) suspension

Suspension/Solvent:  

Possible Sample Composition:

Possible Crystal Structure:
Available Services

NUANCE
- TEM Service
- Keck II Service - XPS, SIMS, FTIR, Raman, Profilometer

Collaboration Details

TEM_Service0006 requested by Monica Kapoor(4913216, monicakapoor2013@u.northwestern.edu) on 10/26/2011

<table>
<thead>
<tr>
<th>Notes</th>
<th>Document</th>
<th>By</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial request</td>
<td>TEM_Service0006_816_20111026121446.pdf</td>
<td>Monica</td>
<td>2011-10-26 12:14:47</td>
</tr>
<tr>
<td>An interesting paper</td>
<td>mka935_JPCM2010.pdf</td>
<td>Monica</td>
<td>2011-10-26 12:30:59</td>
</tr>
<tr>
<td>9R7 result</td>
<td>sli974_9R7.zip</td>
<td>Shuyou</td>
<td>2011-10-26 12:34:00</td>
</tr>
</tbody>
</table>

- Users involved in this collaboration: Monica Kapoor ✗, Shuyou Li ✗, Jinsong Wu ✗

- Add another FOM user in the collaboration: Select user

- Charge service fee, select user: Monica Kapoor ➜ Account: SL ➜ Service: Select service item ➜

- Add comment:

- Attachment (Upload may take a long time. Please reduce your file size as much as possible):
  - Choose File
  - No File Chosen

- Send this comment to all collaborators involved.
NUANCE Center Exploring the Inner Space

Research Centers/Institutes
MRC, IIN, CLP
CCSS, CCNE..

Individual & Faculty Research Groups
NIRTs, IGERTs

Courses & Curricula Development
Short Courses, Thematic Workshops

Outreach
Small/medium industries
Chicago area museums
Students/Parents/Society

NUANCE Eco-System