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# RRC Reporter

## The Newsletter of the Research Resources Center

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This is the inaugural edition of the newsletter of the Research Resources Center, *The RRC Reporter*. It will be published quarterly and will contain information on the instrumentation and services either provided by the RRC or made available to you within the facilities of the RRC. It is our intent that this newsletter will stimulate communication between you the user community and the staff of the RRC. Should a question ever arise concerning the RRC or any of its constituent services, you should not hesitate to call a member of the staff. As a research support service, we have only our service to offer, and it is only service if it meets your needs. Since you will be hearing from us on regular basis through the *Reporter*, we hope to hear from you. This inaugural edition will contain some highlights of a variety of activities now underway that will eventually improve the available facilities and services that the RRC manages.

### Electron Microscope Facilities

RRC Microscopy services at UIC are rapidly being modernized and expanded in both the west and east side Electron Microscope Facilities. In 1997 the campus purchased three, fully computerized, state of the art JEOL electron microscopes with the \$1.25 million cost shared by four colleges (Dentistry, Engineering, Liberal Arts and Sciences and Medicine), and two administrative offices (the OVCAA and OVCR). Last summer and fall two of these instruments, a JEM 1220 Transmission EM and a high resolution, low voltage JSM 6320 Field Emission Scanning EM, were installed in the west side EMF. This was followed by test runs of the instruments and training of the EMF Staff. In December the EMF offered free demonstrations on the unique 6320 SEM so that users could determine its applicability to their samples and research problems. Offers were

extended to all UIC science faculty via Deans and Department heads and Announcements on the UIC web site. Formal training of users on both new instruments began in January.

The long-awaited Zeiss LSM 510 Laser Scanning Confocal Microscope arrived in mid-February after a 7-month delay by the Carl Zeiss company while it solved a number of engineering problems in this newest of their confocal models and which had created a backlog of 30 or more 510s held up in testing. Following the LSCM's arrival and installation, the RRC staff and several groups of users underwent Zeiss training sessions. The RRC staff has worked closely with the faculty Confocal Users Committee and, in particular, its chairperson Dr. Jonathan Art (Anat./Cell Biol.) in selecting the instrument, writing specifications, and several weeks of testing and helping to make it an effective and user friendly centralized research tool.

The four computerized instruments in the west campus EMF (namely, the JEOL 1220 TEM and 6320F SEM, the Zeiss LSM 510, and the Topometrix atomic force microscope) are all being networked to permit transfer of data to other sites including users' offices. In addition, a small EMF Imaging Station is now in place to allow off-line analysis and processing of imaging data from these instruments (see below).

An OPEN HOUSE was held in the west campus facility on March 24 and 25 to formally introduce the two new EMs and laser scanning confocal microscope, Imaging Station, refurbished EMF and its new separate air handling system to the campus with a re-dedication of the facility on the 25<sup>th</sup>. Ninety-five visitors attended and received demonstrations from JEOL and Zeiss application specialists on the new electron and confocal microscopes.

On the east side, the third instrument in the above package of three purchased by the campus, the

JEOL JEM 3010 high resolution Transmission EM, was delivered in mid-January to the developing east campus RRC and is being stored for a short time while construction of its laboratory is completed. Also delivered in the same week in January, an atomic resolution JEOL 2010F dedicated FE-STEM purchased with a \$1.6 million NSF grant awarded to Nigel Browning, department of Physics plus matching funds from a variety of colleges and administrative units. This instrument was delivered to its newly completed laboratory space in the east side RRC and installation started immediately. Due to its sensitivity, this instrument required installation of protective compensation systems against interference from vibrations and magnetic fields.

Microscopy is also undergoing several personnel changes. The RRC welcomes Dr. Alan Nicholls, formerly with VG Microscopes for 12 years. Alan has been hired to manage the EM facility in the east campus RRC. Dr. Nicholls, who hails from England, worked with VG Microscopes and is an expert in dedicated field emission STEM (i.e. atomic resolution) instruments. The east side EMF will contain two FE-STEMs: the new JEOL 2010 and a donated VG STEM, in addition to the high resolution 300kV JEOL 3010 TEM and at least one other EM. He will manage a service support program, contracted through the RRC, for other institutions needing VG support.

The RRC is currently recruiting for a newly created RRC academic professional position, Confocal Microscopist. Several applications have been received, and, since late February, members of the confocal advisory subcommittee have been participating in the interview process. Funds from the OVCR helped to upgrade the position to that of an academic professional with significant confocal experience and skills including technical consultation, technical training and providing service. Until this position is filled, assistance on use of the Zeiss 510 will be supplied by the RRC EMF Staff.

With the retirement of senior Electron Microscope Technologist, Ms. Lucia Vedegys, Ms. Kristina Jarosius was promoted to EMT-IV which includes supervisory responsibilities in the EMF. To fill the vacancy, a search was initiated to find someone not

only with excellent EM skills, but with computer and imaging expertise and either the skills or the background and capacity to learn other microscopy techniques available in the EMF. The RRC is happy to announce the hiring as of March 23<sup>rd</sup> of Ms. Linda Juarez who comes to us with many years' experience. Both Kristina and Linda have received training on the Zeiss 510.

### **RRC East Facilities**

Within the newly evolving east campus RRC, the first three of six construction phases are nearing completion. Construction of the new lab for the JEOL 2010F STEM has been completed, and those for the JEOL 3010 TEM, JEOL JXA-733 Microprobe and Vibrational Spectroscopy are nearing completion. The construction of the 12,000 sq. ft. facility on the first floor of Science and Engineering South is being undertaken with funds provided by the campus. Thanks to an innovative design and construction process headed by Mr. Waleed D'Keidek from the Large Projects Division - Infrastructure, Capital Programs, this project has moved ahead at a rapid pace and with significant cost savings to the University over the original estimates that were obtained. The east campus RRC will house electron microscopes, NMRs, mass spectrometers, vibrational microscopy and x-ray diffraction spectrometers. The Phase IV construction plans have been let for bid, and some of the work already is in progress. A portion of the Phase V/VI plans have been let for bid, and the remaining plans are nearing completion.

### **Nuclear Magnetic Resonance**

These resources are also in a growth phase. A new Bruker 500 MHz NMR console was installed on the existing Oxford superconducting magnet in the west campus RRC. A loose strut was found in the vacuum dewar when the magnet was rebuilt. This was a likely cause for the magnet instability that has been problematic over the years. The Bruker console has met the installation specifications on the rebuilt magnet. Twelve investigators have been checked out for use on the instrument, and 1D experiments for H1, C13 and P31 are being run without difficulty. However, several common 2D

experiments are still not running successfully, and Bruker has been asked for assistance to determine the cause. A funding plan has been developed to purchase additional probes to expand the uses of this instrument. A 1 Gb JAZ drive has been installed and has become the standard medium for data storage providing compatibility with the Bruker 300 in Pharmacy. However, "bugs" have been identified in the use of the JAZ drive with the spectrometer software and the problem reported to Bruker. In addition, the Room Temperature Shims on the Nicolet 360 MHz NMR have been refurbished, which makes the instrument much easier to use. Inquiries concerning NMR services should be directed to Dr. Robert Kleps.

A purchase order for two NMR spectrometers for the east campus RRC has been issued. A 500 MHz spectrometer with 3 RF channels, Z-gradient and pulse-shaping, and a 400 MHz spectrometer with 2 RF channels and Z-gradient have been requested. Both systems will have a Bruker console and a Magnex standard-bore superconducting magnet mounted on TMC vibration-damping legs. A variable temperature unit for work at *ca* 0°C will be shared by the two spectrometers. Many thanks to Dr. John Harwood (Chemistry) for identifying the needs, setting the specifications and issuing the purchase request.

### **Mass Spectroscopy**

We welcome Ms. Khanh Do to the RRC Mass Spectrometry service. Following graduation from the University of Michigan and Northern Illinois University and a brief stint in industry Khanh began work in the Mass Spectrometry Laboratory in January. The Kratos MS50, Extrel GC-MS and VG7070 spectrometers all have been put into operation and used to analyze research samples. The Extrel has been upgraded with a new computer and with the capability for split-splitless and cryofocusing on-line sample injection into capillary GC columns with the capability of subambient operation of the oven. In addition, the RRC has received shipment of a Kratos Concept mass spectrometer, to replace the aging VG7070. The Concept provides 'high resolution' capabilities over a much greater mass range than was possible with the VG7070. With the Concept it will be possible

to scan to masses over 8,000 amu at unit mass resolution. The instrument is equipped with electron impact, chemical ionization and fast atom bombardment ion sources. In addition to augmenting our capability for analyzing high-molecular-weight compounds, the masses of ions can be determined with sufficient accuracy during GC-MS analysis to permit identification of the formulas of eluting compounds. Plans are being put into motion to complete the renovation of the Mass Spec Lab with new air handling and lighting. Decommissioning of the VG7070 and installation of the Concept are being planned to coincide with this renovation work. In addition, a new Finnegan LC-electrospray-MS-MS has been ordered for delivery shortly after completion of the renovation. This instrument will further enhance our capability for analyzing high-molecular-weight compounds and for peptide sequencing. Inquiries should be directed to Dr. Stuart Scheppele.

### **Scientific Computing Group**

With the acquisition of new instrumentation, the Scientific Computing support group has been very busy and continues to work with the facility directors as new equipment is installed and existing equipment is upgraded. All the computers, new and old, that are part of the RRC, including instrument consoles and independent analysis machines, are being made part of the RRC network domain. This will facilitate the movement of acquired data among computers in the RRC, and between RRC computers and the investigator's own office and laboratory PC's. An EMF Imaging Station is the lead example of an effort to establish local RRC "analysis areas," where appropriate, that are equipped with high-speed computers and software specific to the associated facility's mission and/or are required by faculty users. Funds to begin the process of developing a centralized research computer resource have been provided by the OVCR and committees appointed to evaluate the best ways to utilize these

### **Other Spectroscopy**

Vibrational Spectroscopy became part of the RRC's services with the arrival of a new Raman

Microscope/Spectrometer from Renishaw. The Raman instrument currently is being operated in the laboratory of Dr. Yuri Gogotsi in SEL until construction of the Vibrational Spectroscopy Laboratory in the east campus RRC is completed. In addition, an Infra-red Microscope/Spectrometer was installed on a demonstration basis for several months by the Bio-rad company. Many thanks to Dr. Yury Gogotsi (Mechanical Engineering) and Dr. Davorin Babic (Electrical Engineering and Computer Science) for spearheading the efforts to obtain the necessary funds and for testing the equipment from the various manufacturers.

A JEOL JXA-733 Microprobe was obtained from Northwestern University during the summer of 1997, and a grant submitted to NSF was funded for a full computer upgrade. Preparations for installing and upgrading the Microprobe in its new laboratory space in the east campus RRC are ongoing. Many thanks to Dr. Martin Flower (Earth & Environmental Science) for negotiating with Northwestern University for the Microprobe and for writing the successful NSF Grant Application. Inquiries should be directed to Dr. John (Art) Anderson.

### **Other Issues**

Moves to assess, strengthen, and make centralized resources more effective are taking place on several fronts:

FY99 Budget Request: Last spring the RRC's FY99 budget request was submitted along with the overall request from the Office of the Vice Chancellor for Research. This request was well received and was included in the campus's priorities when the final budget was prepared. It was approved by the IBHE and forwarded to the legislature by the Governor. The request would represent the first major increase in the RRC's budget in many years and would allow the RRC staff to begin the implementation of the Strategic Plan that was developed as part of the self-assessment process that was undertaken when the reporting lines were changed. One of the key components of this request was the establishment of a recurring budget for the upgrading and/or purchasing of equipment to help keep the equipment

and services available in the RRC abreast of the ever changing technology. The Strategic Plan is a sixteen page document that was developed as a long range planning document to provide a foundation for evaluating progress and, as mentioned above, to help justify an increased recurring budget.

Research Infrastructure: At an OVCR sponsored retreat held last spring, research infrastructure was a major topic of discussion. The issue of research infrastructure at UIC is woven throughout all the issues that are currently being dealt with by the OVCR/RRC staff as they effect centralized instrumentation and support services. The VCR will soon announce the appointment of the Task Force on Research Support Services. This task force will identify the current resources available and how they are supported and managed; identify the methods in place for acquiring, maintaining and replacing equipment; and identify the new or changing needs for research support services. The end result of this group's work will be recommendations for institutional policies, procedures and fiscal support for the research support services at UIC.

DNA Sequencing Laboratory: Following the last meeting of the RRC Advisory Committee, the Director of the DNA Sequencing Laboratory within the section of Hematology and Oncology announced that the facility would be closing at the end of November. A meeting was scheduled to discuss what steps would be required to keep the service running. The answer was additional funding in excess of that already committed by the VCR. Since the amount needed would triple the total subsidy, it was originally decided to pursue a subsidy plan supported by the colleges whose faculty use the service. When initial efforts to put together a subsidy package indicated that this would not produce the desirable results, other options were explored. We are happy to announce that the OVCR will be providing the necessary funds to restart the DNA Sequencing Laboratory. The specific details for day-to-day management, billing mechanisms and reporting lines are still being discussed, but a grand re-opening event will soon be announced.