

# The University of Newcastle Electron Microscope & X-ray Unit (EMX)

## NOTES FOR USERS

### *INTRODUCTION*

The EMX, sited in the Aviation annex building, is a central service under the direction of the Research and Innovation Division. It is available to all members of the University and the function of the EMX is to provide facilities to all UON Faculties and Schools, Institutes and Centres.

The aim of the EMX is to enable its users to obtain results and basic instrumental operating skills as easily and quickly as possible, and to assist those who wish to achieve a higher level of competence.

**Before attending the EMX, ALL users must register in our system (ACLS), ALL users must provide a signed subscription form and ALL users must complete the relevant online training courses accessed via the link given below:**

<http://www.newcastle.edu.au/research-and-innovation/resources/central-scientific-services/emx/booking-and-training>

**Please send signed subscription forms and certificates of completion for the online training courses to [emxray@newcastle.edu.au](mailto:emxray@newcastle.edu.au) before contacting us regarding a booking for an induction to work in the EMX. ALL users must undergo an induction before commencing work in the EMX.**

**Inductions will be held once a month for new users.**

**Users with a current subscription and induction will be issued with swipe card access to the door to room avlg29 (main EMX lab). This access will be for a twelve month period and will correspond with the subscription period. Subscriptions and swipe card access will be processed at the end of each month. Swipe card access is for the *specified* User only. **DO NOT** share your card with anyone else. **DO NOT** use your card to admit other people into the labs. **DO NOT** provide access to the EMX labs to any other person. Non-compliance will result in termination of access.**

**ALL users of the XRDs will be required to attend a COMPULSORY X-ray Safety Training course, which is run twice a year at the University. Please provide a copy of your course certificate to [emxray@newcastle.edu.au](mailto:emxray@newcastle.edu.au)**

**You must notify us of any dangers relating to your samples. Users must provide information on the possible dangers inherent in their samples, for example asbestos, arsenic or other hazardous materials.**

**All users must provide SDS for chemicals and samples brought into the Unit. If you do not already have them, SDS may be obtained through Chemwatch. If your sample does not have an SDS available (eg for an unknown material), you must provide as much information regarding dangers relevant to your sample as possible.**

**These notes cover the basic operation of the EMX.**

**Additional information may be found on the WEB PAGE:**

**<http://www.newcastle.edu.au/research-and-innovation/resources/central-scientific-services/emx>**

**A staff member will work with new users until they are considered to be sufficiently confident and capable of operating an instrument solo. Always arrange session times with a staff member, and always wait until they are present before working with a machine.**

## **STAFF**

Mrs Jenny Zobec – Acting Manager and X-ray Specialist.  
[jennifer.zobec@newcastle.edu.au](mailto:jennifer.zobec@newcastle.edu.au)

The SEM and TEM Specialist positions are currently vacant, but casual staff are employed:

Dr Huiming Zhang and Dr Yun Lin

Contact details:

Our central phone number accessible by all EMX Unit staff is X **15667**

Our central email accessible by all EMX Unit staff is [emxray@newcastle.edu.au](mailto:emxray@newcastle.edu.au)

**Email is the preferred form of contact. Please use this email address to request a booking.**

## **SAFETY**

**You MUST make sure that you are aware of the safety precautions relevant to your own work in the EMX, for example as specified in your safety clearance or as stated on an SDS.**

**The EMX has obtained safety clearances for all SOPs (GEPs and GFPs) used within the EMX. You MUST follow the procedures stated in the EMX SOPs. You MUST NOT change any procedures.**

In particular;

**Radiation Safety** – The University's Radiation Safety Policy is stored in the OHS General Information folder on the bench outside room AVLG35. You will be instructed in safe use of the equipment by a member of the EMX staff. You must NEVER attempt to override any safety features of any of the equipment. All XRD users must attend **compulsory** X-Ray Safety training. Courses are held at the University twice a year and dates for the courses are advised well in advance.

**Chemicals** - Observe the handling and disposal procedures displayed in work areas. Let EMX staff know if you need to bring additional chemicals into the labs and provide an SDS for every chemical you bring in. All chemicals must be adequately labelled and are to be removed from the EMX as soon as you have finished using them.

**Eye Protection** – PPE must worn where a risk of eye injury exists. Hazards that may occur in the EMX include dust and flying particles. Safety glasses must be worn when preparing samples if dust or flying particles may be present.

**Hand Protection** – leather gloves are provided for use with the drying ovens and should be used whenever items are removed from the ovens. Gloves are also provided for use when preparing samples if required. Please make sure to remove your gloves before touching door handles, light switches, computer keyboards or instrumentation etc.

**Protective Footwear** – Enclosed footwear must be worn in the EMX. Suitable shoes include boots and sturdy runners or lace ups where no part of the foot is exposed. Unsuitable shoes include thongs, sandals, open heeled shoes, or any shoes where the foot is uncovered. Anyone wearing unsuitable shoes will be asked to leave the EMX immediately.

**Clothing** – Appropriate clothing must be worn in the laboratory. Clothing must be such that it cannot become entangled in equipment or pose any foreseeable hazard (contain loose items of clothing and other items such as lanyards). Clothing that covers your skin must be worn when using chemicals, and long hair should be

restrained to ensure it cannot become entangled in equipment. Lab coats are available in the foyer of the Unit.

**General Lab Safety** – keep aisles and exits free from obstructions. Keep benches clean and free from contaminants. Clean work areas and equipment after use. Wash your hands after completing work and on leaving the EMX.

## ***UNIT EQUIPMENT***

JEOL JEM-1200EXII TEM (1992) + digital imaging (2007)

JEOL LaB6 2100 TEM (2011)  
STEM (scanning transmission electron microscopy)  
+Light element EDS  
+Gatan digital imaging system

Phillips XL30 SEM  
+ Oxford ISIS EDS (1997)  
+ Gatan MiniCI Cathodoluminescence detector

Zeiss Sigma VP FESEM (2011) +Bruker EDS

Phillips X'Pert MPD XRD with 45 position sample changer/spinner, multipurpose sample stage, eucentric cradle and air/ inert gas atmosphere hot stage to 1600°C

Panalytical XPert PRO MPD XRD with 15 position sample changer/ spinner and multipurpose sample stage

SPI Gold sputter coater

SPI Carbon coater

Cressington Carbon Coater

Balzers Critical Point Dryer

Leica EM UC7 ultramicrotome

Gatan PIPS (precision ion polishing system or ion beam thinner)

Dimple Grinder

Tripod polisher

## ***BOOKING INSTRUMENTS***

Allocation of machines is at the discretion of EMX staff, depending on needs and demand. Bookings may be requested by sending an email to [emxray@newcastle.edu.au](mailto:emxray@newcastle.edu.au)

## ***TRAINING***

### **Users must not instruct others how to operate equipment.**

On any equipment **NEVER** alter instrument settings unless you have been shown, and understand exactly what you are doing. **YOU MAY DAMAGE THE INSTRUMENT!** If you feel doubtful about ANYTHING at all, please ask us for assistance. If you think a machine is malfunctioning in any way, **DON'T TOUCH IT - call a staff member!**

**Individual Users:** One of the main functions of staff is to teach users to operate equipment, and this is generally done on a one-to-one basis. Please do not hesitate to ask staff for help or advice, and **DO NOT try to operate an unfamiliar machine.**

**Undergraduate courses:** The facilities of the EMX may be used for undergraduate courses, **as long as only small groups of students** eg (8-10 people) are in the unit at any one time. Organisers of courses who intend to use the EMX as part of a practical course are asked to arrange with EMX staff as early as feasible in the year. Teaching is often done by a combination of EMX staff and the course lecturers, but instrument demonstrations will usually be performed by EMX staff.

**IT MAY NOT BE POSSIBLE TO ACCOMMODATE LAST-MINUTE BOOKINGS FOR STUDENT GROUPS**

## ***CLEANING UP and WASTE DISPOSAL***

We do not provide sample storage or disposal. You are responsible for removing your samples from the EMX when your analysis is complete. Do not dispose of hazardous materials in the sinks and make sure that you know the appropriate disposal techniques for your sample type (refer to the SDS). Yellow sharps bins are available for disposal of blades, glass cover slips and glass slides, microtome knives etc.

After using bench space or equipment in the unit, remove your personal possessions and leave the area tidy. SEM stubs can be stored in the desiccator in the lab for short periods until you are sure you have finished examining them. Be sure to fill in the log book identifying the location of your samples. Please come and

clean up the stubs when you no longer require them.

XRD samples should be removed from sample holders after analysis and the sample holders washed in clean water and then dried in the drying oven. When a sample changer batch has been run overnight, it is expected that you will come and clean out your samples/ holders first thing the next working day.

## ***PUBLICATIONS***

**The publications produced from work done in the EMX constitute our main “bottom line”, and the justification for our funding. PLEASE let us know about any papers published which include work done with any EMX facilities and send us an electronic copy.**

If the resources of the EMX contributed in any way to a publication, there should be a general acknowledgement to the EMX. Any further individual acknowledgements are at your discretion. We are always interested in displaying relevant posters/ papers in the EMX if you provide us with a copy.

## ***CHARGES***

From January 2009 all internal users, except for undergraduate and Honours students, will be required to pay \$500 before access will be granted to the instruments. Access is for a single calendar year from January until December, regardless of when you start your subscription. It is assumed that internal users will learn to use the equipment themselves.

## ***EXTERNAL GRANTS***

Newcastle University staff writing grant submissions that will involve use of these facilities must include the subscription fee for all their users of the EMX.

## ***DATA STORAGE & EMX COMPUTERS***

Your data is **YOUR** responsibility. The EMX has a server and after you have been issued with a **username** and **password** (see EMX staff), you may use the server to temporarily store your data. You need to download your files from our server onto your own storage device. **DO NOT** use flash drives or external HDDs, or do web browsing or send emails with our instrument computers. The PCs in our data area are available for general use.

**You have full access to your data, so if you delete it, it has GONE!!!!**

The larger capacity of the server means your data will be available for several months **but you must still keep copies of all your data, as the EMX does not archive user’s data. The previous years data is deleted every January.**

**DO NOT install software on our computers and DO NOT change our pc**

settings.

**DO NOT** use external hard drives, do web browsing or check emails on instrument PCs. Please use the general access PCs at the entrance to the unit.

EMX website

<http://www.newcastle.edu.au/research-and-innovation/resources/central-scientific-services/emx>