



**Department of Physics**  
High Resolution Electron Microscopy Laboratory  
P.O. Box 413, Milwaukee, WI 53201  
*Prof. Marija Gajdardziska-Josifovska, Laboratory Director*

**Project Background Information**

*To be completed by Project Director/ Professor*

Project Title: .....

Project Director: .....

Address: .....

tel.: ..... fax: ..... email: .....

Account Number: ..... Expiration Date: .....

Category of Project: Internal (UWM):  External (Non UWM):  Proprietary:

Project Description (Append an extra page if needed): .....

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List materials in sample: .....

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Research Personnel involved in project (names and roles):

- 1. ....
- 2. ....
- 3. ....
- 4. ....

Research Personnel who will perform microscopy. Indicate prior microscopy training and familiarity with TEM, HRTEM, SAD, CBED, EDX, Digital Imaging: .....

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Received (Donald Robertson) Date

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Signature (Project Director) Date

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Approved (Prof. Marija Gajdardziska) Date

## **HRTEM Specimen Preparation Laboratory Equipment List**

(Physics Building, Rm. 326, tel.: 414-229-5506)

1. **Slow Speed Diamond Saw / Isomet 1000 Precision Saw**  
(Adjustable from 100 to 975 RPM, for cutting thin slices of sample)
2. **Ultrasonic Disc Cutter / Fischione Model 330**  
(Cuts discs from thin-sliced samples, for TEM examination)
3. **Specimen Flat Polisher-Grinder / Minimet Polisher-Grinder;  
Buehler Polishing Wheels and sample holder**  
(Thins and polishes samples prior to dimpling process)
4. **Dimpling Grinder-Polisher System / Fischione Model 2000 Specimen Prep System**  
(Thins sample for TEM examination by dimpling action)
5. **Ion Milling System / Precision Ion Polishing System model 691**  
(Ion mills sample for TEM examination)
6. **Ultrasonic Cleansing System / Branson model 5210**  
(Removes fine contaminants from samples and instruments)
7. **Optical Microscopes**  
**Compound Microscope (Trans / Rfltd illum; Olympus BX60)**  
(Bright Field, Dark Field, and DIC capabilities; Z-axis measurement capability to 1  $\mu\text{m}$  to examine samples throughout preparation procedures)  
**Stereo Microscope (Olympus SZ60)**  
(To facilitate handling / manipulation of samples)
8. **Assorted supplies for specimen preparation**  
(Adhesives, polishing compounds, polishing cloths, solvents, specimen storage containers, swabs, pipettes, razor blades, tweezers)

## HRTEM Laboratory Equipment List

(Physics Building, Rm. 50, tel.: 414-229-2511)

**1. Hitachi H-9000NAR TEM**

(Accelerating voltages: 100, 150, 200, 250, 300 kV; point -to - point resolution of 0.18 nm, lattice resolution of 0.11 nm; specimen stage with adjustable tilt in one or two axes; record data on film or digitally; capable of performing HRTEM, TEM, REM, SAD, CBED, EDX)

**2. Voyager II X-Ray Quantitative Microanalysis 2100/2110 System**

(X - ray quantitative microanalysis by Noran Instruments)

**3. Gatan Multi Scan CCD Camera with Digital Micrograph 2.5 Software**

(Acquires, processes, analyzes, displays, prints, and archives images from HRTEM, TEM by Gatan Instruments)

### Contact Numbers

**1. HRTEM Director: Professor Marija Gajdardziska-Josifovska**

**Rm. 323, tel.: (414) 229-4965,**

email: mgj@uwm.edu

**2. Instr. Specialist: Donald Robertson, Rm. 329a, tel.: (414) 229-2753,**

email: donald@uwm.edu

**3. HRTEM Graduate Students:**

**Dan Giese, Rm. 327, tel. (414) 229-4959,**

Rm. 224, tel. (414) 229-6807,

email: dray@uwm.edu

**4. Physics Business Manager:**

**Sue Arthur, Rm. 434, Tel (414) 229-4225,**

email: piggysue@uwm.edu

## HRTEM Laboratory Access Rules

### 1. Training and Certification

#### 1a) Experienced Microscopists

Upon demonstrating proficiency with lab instrumentation to satisfaction of lab director, experienced microscopists will be permitted to work unaccompanied by lab support personnel.

#### 1b) Novice Microscopists

Lab director and support personnel will train and assist novice microscopists, until they can demonstrate competence with lab procedures and proficiency with lab instrumentation, to the satisfaction of the lab director. At such time, they **may be permitted** to work in the lab unaccompanied.

#### 1c) Collaboration / Consultation Options

At the discretion of the lab director, collaboration / consultation on research projects will be considered in situations where training of research personnel is impractical.

### 2. Scheduling Lab Time:

To be arranged, on a first come, first served basis, contingent on prior commitments, and work schedule of lab personnel.

### 3. Acknowledgment:

Acknowledgment is expected for use of the laboratory and for assistance in specimen preparation and microscopical examination. Co-authorship is expected when HRTEM researchers contribute to data interpretation and/or execution of any substantial parts of the microscopy experiments and the specimen preparation.. A copy of any publication resulting from use of the laboratory should be submitted to the lab director.

### 4. Billing:

Billing must be arranged before work can start. The laboratory charge schedule follows. Two modes of payment are acceptable: 1) Deposit of funds prior to beginning of project with further adjustments via periodic invoices; 2) Periodic payments after work has started due on receipt of invoice. Funds should be transferred to account # **128-B-48-6595-4-9342**.

## HRTEM Laboratory Charge Schedule

<b>I. Microscope Time Charges:</b>	UWM Internal Researchers	\$ 20.00 / hour.
	External Researchers	\$ 40.00 / hour.
	Proprietary Research	\$ 150.00 / hour.

**II. Imaging Consumables:** Film, paper for dye-sublimation printer, and magneto-optical disks for digital image storage will be provided at cost.

**III. Personnel Time Charges:** Training and Assistance \$ 15.00 / hour.

### **IV. Consumables for Specimen Preparation:**

Six different classes of users are anticipated based on the following criteria:

- 1) Affiliation with UWM (i.e. internal or external user);
- 2) Who performs the specimen preparation (i.e. user or lab staff);
- 3) Where the sample will be examined (i.e. at UWM-HRTEM laboratory or elsewhere).

Code	User Designation	Billing
<b>I-U-TEM</b>	<b>Internal</b> (UWM), User prepared samples, examined at UWM- <b>HRTEM</b> Lab.	Purchase <i>itemized* consumables</i> at cost; cost of <i>other** consumables</i> recovered from microscope time fee.
<b>I-U-E</b>	<b>Internal</b> (UWM), <b>user</b> prepared samples, examined <b>elsewhere</b> .	Purchase <i>itemized* consumables</i> at cost; cost of <i>other** consumables</i> recovered in kind or by flat fee.
<b>I-S</b>	<b>Internal</b> (UWM), <b>staff</b> prepared samples, examined at UWM- <b>HRTEM</b> Lab. and/or <b>elsewhere</b> .	Charge per sample based on the estimated requirements of each case. Estimate based on personnel time, cost of consumables, and equipment amortization.
<b>E-U-TEM</b>	<b>External</b> (non-UWM), <b>user</b> prepared samples, examined at UWM- <b>HRTEM</b> Lab.	Purchase <i>itemized* consumables</i> at cost; cost of <i>other** consumables</i> recovered from microscope time fee.
<b>E-U-E</b>	<b>External</b> (non-UWM), <b>user</b> prepared samples, examined <b>elsewhere</b> .	Purchase <i>itemized* consumables</i> at cost; cost of <i>other** consumables</i> recovered in kind or by flat fee at rate double that of internal users. ( $E-U = 2 I-U$ )
<b>E-S</b>	<b>External</b> (non-UWM), <b>staff</b> prepared samples, examined at UWM- <b>HRTEM</b> and/or <b>elsewhere</b> .	Charge per sample based on the estimated requirements of each case at a rate double that of internal users. ( $E-S = 2 I-S$ )

*HRTEM Laboratory Charge Schedule Cont'd*

**\* Itemized Consumables:** The following consumables for specimen preparation will be provided at cost and must be acquired by the project director before initiation of work:

- 1) diamond saw blade;
- 2) diamond polishing compounds (6 $\mu$  and 1 $\mu$ );
- 3) tweezers (1 rough and 1 fine);
- 4) specimen storage container;
- 5) specialty specimen support grids if needed.

These consumables will be property of the project director and his/her research group.

**\*\* Other Consumables:** This category is made of those consumables which are difficult to quantify, such as solvents, adhesives, polishing substrates, swabs, glassware, ultrasonic drill-tools, specimen grids, etc.. Special arrangements need to be made to recover these costs (i.e. donation in kind to the specimen prep lab supplies, or a flat fee based on the type of sample made), when the sample preparation is not followed by TEM work at UWM.

**For billing questions contact:**

**Sue Arthur (414-229-4225)**

**Donald Robertson (414-229-2753).**

**Glossary**

**HRTEM:** High Resolution Transmission Electron Microscopy

**TEM:** Transmission Electron Microscopy

**SAD:** Selected Area Diffraction

**CBED:** Convergent Beam Electron Diffraction

**EDX/EDS:** Energy Dispersive X-Ray Spectroscopy