

Final Project Report 2003 – 2004
Assembly and Initial Operation of a Transmission Electron Microscope

Society of Physics Students
Drake University
Des Moines, Iowa

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Abstract:

Members of the SPS Chapter at Drake University will assemble and operate a Transmission Electron Microscope. The assembly process will provide direct laboratory experience for the students involved and the end result will be continuing educational and research opportunities for a multidisciplinary program involving undergraduate Physics and Biology majors at Drake.

The purpose of our project was to restore the functioning of a JEOL 100cx Transmission Electron Microscope that was donated to the Department of Physics and Astronomy at Drake University in September 2002. In the period prior to obtaining the grant, a partial inventory of the microscope components was completed, important power connections were reestablished, the air compressor was connected to the rest of the compressed air system, the oil rotary pump was refilled and connected to the vacuum system, and the chiller was cleaned and filled with distilled water. The water-cooling system was also connected to an input water supply with a solenoid valve to control the flow of water into the water-cooling system, and the functioning of the water-cooling system was tested to ensure adequate functioning of the input water supply and the water drainage system.

However, during the course of a routine inspection of the room in which the microscope was housed, the microscope was labeled as a radiation hazard and access to the room was restricted for three months. At that time a lead chamber was also present inside the room, which was used for handling radioactive materials. The input water supply for the microscope was located within the lead room. However, after an inspection that was carried out at the end of the three months, a decision was made to remove the lead chamber. Therefore, the power supply to the room was interrupted, access to the input water supply and the drainage system was disrupted, and everything in the room, including the microscope, was covered in a layer of drywall powder.

At this point we were again allowed to reenter the room and resume our progress on rebuilding the microscope, after extensive cleaning of its various components. During this period we consulted the manual and completed our inventory. We also requested that water and power supply be restored to the room. In the meantime we traced the valves and connections of the vacuum, compressed air and closed water systems, and noted the locations of any missing connections. We are now in the process of purchasing replacement hoses to compensate for the changes in the input water supply and drainage system and ensuring that there are no leaks in any of the connections. Towards the end of last semester we added another member to our group, from the Department of Pharmacy at Drake University. With his assistance, we soldered the loose wires on the column according to the schematics in the microscope manual.

Earlier this year, we presented a poster describing our project at the Drake University Conference on Undergraduate Research in the Sciences (DUCURS) in April 2004. This allowed us to acquaint students and faculty members at Drake University with the objectives of the project and generate further interest in a collaborative venture.

At the beginning of this semester two biology students, a sophomore and a junior, joined our project and began familiarizing themselves with the functioning of the various components of the microscope. Although a 220-volt outlet was installed in the room at the beginning of this semester, we discovered that a fuse on the circuit had blown and that it needed to be replaced. We connected the water to the new faucet however, and replaced the water in the chiller.

At this point we have been able to turn the microscope power supply on and check the functioning of the vacuum system. Next semester, we're planning to follow the evacuation and re-pressurization procedure in the manual so that the rest of the column can be assembled. Despite numerous delays during the last year, we are back on track

with our project and looking forward to completing the assembly of the microscope early next year.

Grant Inception to Date Form (FRIGITD) 6.0.0.1 (DUSIS) 09-DEC-2004 03:04 PM

Index: Grant: Year:

Fund: Orgn:

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Acct Type: Acct: Account Summary:

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Code	T	Desc	Adj Budget	Activity	Commitment	Avail Bal
75060	E	Grant Equipment/	1,500.00	46.54	0.00	1,453.46
Net Total:			1,500.00	46.54	0.00	1,453.46

fund 105060

**BUDGET INFORMATION
FOR SPS GRANT (UNDERGRADUATE
RESEARCH AWARD)**

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