NetNotes

Edited by Thomas E. Phillips
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Selected postings from the Microscopy Listserver from September 1, 2014 to October 31, 2014. Complete listings and subscription information can be obtained at http://www.microscopy.com. Postings may have been edited to conserve space or for clarity.

Specimen Preparation:
synthetic scaffold that dissolves in ethanol

Recently one of our users asked about how to prepare synthetic scaffolds with cells attached. The material that makes the scaffolds dissolves in ethanol. Is there any way to avoid using ethanol but using something else (e.g., acetone) and proceed with critical point drying (CPD)? Or we might have to do freeze drying? ***Xuanhao Sun sunxh163@gmail.com Mon Oct 20***

Yes, you may critical point dry in acetone but before you do I'd ask the investigators if they have tried acetone on the scaffolds for it may dissolve them too. Another question would be have they fixed the material with glutaraldehyde followed by osmium tetroxide before putting it into ethanol? If it becomes stable it could eliminate your problem. The second point is that the vapors from the CPD need to be vented into a chemical hood so that you are not exposed to the acetone which one should not breathe. Run off a copy of the MSDS sheet for safety recommendations. The third point is that you will need "dry acetone". Do not use acetone from a big old jug! I have successfully used Mallinckrodt 2440 analytical reagent grade. It has a water content of 0.2%. It is available in pint bottles that are good for they do not set around for a long time before being used up like the gallons do. I had made the dilutions from it and of course used it in the CPD chamber at 100%. I believe that several of the EM suppliers also supply acetone that is "dry". I have heard of using amyl acetate in the CPD but know that the old Sorval CPD instructions said that the O-rings needed to be changed to a different material for the standard ones would not hold up. Amyl acetate is also nasty and must be vented to a hood. I do not recall what was used for the dehydration before putting the samples into amyl acetate for I had not used it. HMDS is sometimes used in place of CPD but ethanol is used for dehydration up to 100% so that is not a good substitute. Patricia Stranen Connelly connellyps@nhlbi.nih.gov Mon Oct 20

Specimen Preparation:
long-term storage in ethanol

I had a question for a local histopathologist that I decided to extend to the List: I have a client who is looking at deep-sea, meso- and surface soft coral polyps, Gorgonians. She has contributed thousands of samples to (redacted) Museum, and they are having a strong disagreement about how they should be stored. The old-timers say to store in 70% ethanol. I have more recently heard arguments for 85% ethanol, but I can't document that. And she is determined to store them in 95% ethanol, which some museums seem to be adopting. Certainly the protein and genomics look a lot better in material stored in the 95% ethanol. Her mentor recently looked at polyps stored in 95% in one of those desktop SEMs, and he says he has less shriveling, but we don't really have a good experimental set. While we wait to design experiments to test this, I thought I would ask your opinion. What is the current word on long-term storage for histopathology/museum specimens? Meanwhile, she also had to collect some specimens into different concentrations of rum, and now I want to test that, too, since it will also have some sugars to keep the osmolarity up! ***Tina (Weatherby) Carvalho tina@pbrc.hawaii.edu Tue Oct 21***

For long-term storage ... more than one preservative. Some samples in 95% for future protein/genomics work, some in 70% ethanol (maybe 80%)+5% glycerin for external morphology. To be really exciting, I'd also process some samples for light or confocal microscopy/TEM/SEM - fix/dehydrate/embed, and store as embedded samples. But long-term storage in alcohols is likely to lead to extracting lipids and the morphology will go away. Oh! Is there any possibility that the museum can store the samples below 25°C? If yes, get them through 95% ethanol, then into 100% t-butanol, let that freeze (25°C), and store them in that. Be better than in ethanol of any %. I assume t-butanol is good for genomics, etc., but that should be checked, and the morphology should be better. Decent for SEM, anyway. Tissues in fixative are fine after a couple of years (even for TEM), but ... archival? Do you or the museum have some old samples that can be sectioned and examined? Phil Oshel oshel1pe@cmich.edu Wed Oct 22

Specimen Preparation:
textbook

We are in the process of developing a biological EM sample preparation class. We haven't had this class available for a few years and the previous instructor didn't use a formal text. We now are looking for a textbook that will cover most of the basic preparation strategies for both SEM and TEM biological sample preparations. Any and all recommendations for texts that are currently in print would be very helpful for us. ***Mike Standing michael_standing@byu.edu Thu Oct 23***

I'm hoping for good replies myself. We haven't found any recent EM texts that cover biological prep for class use. We're still using John Bozzola's book for our TEM course, hoping that someday he'll get tired of retirement and write a new edition (you still read this list, John?). The only other texts I know of are Glauert & Lewis and Dystra and Reuss, but they're no newer. There is a crying need for modern microscopy class texts, especially for life sciences. The new EM books are excellent references, but not great for class texts. Phil Oshel oshel1pe@cmich.edu Fri Oct 24

Specimen Preparation:
preparing CO_2-free water

How essential is it to prepare CO_2 free water for mixing and using lead citrate stain? I have always done it, but wonder if anyone has tried skipping it. How about alternate ways to prepare it. Boiling is the standard, but anyone boil using microwave or I have heard sonicating might work too. Sitting here with a scalding flask of water, wondering if I can cheat the EM gods. ***Jonathan Krupp jkrupp@deltacollege.edu Fri Oct 10***

What is the downside of doing this just to be sure? There aren't many steps in science easier than "boil water". I have used a microwave but to ensure long enough boiling, it makes it a little

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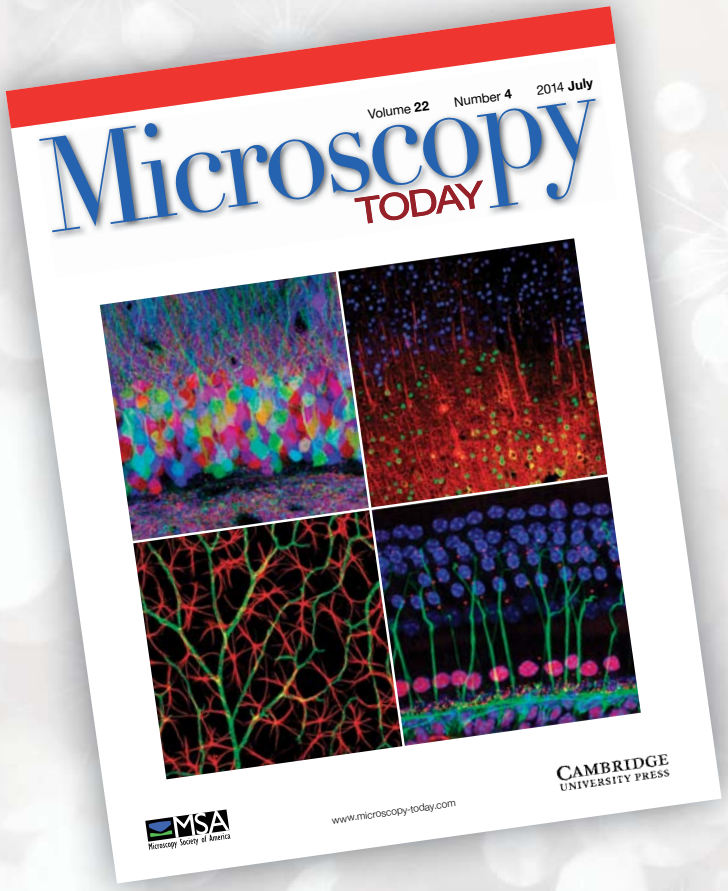

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messier since the water spills over. A hot plate is probably worth the effort. I am sure sonication works but that is more trouble than needed since you don't have to worry about evaporative loss or flammability when you boil water unless your lab is adjacent to a fracking well! I have used sonication in the steps involving getting lead nitrate or lead citrate to go into solution but only since I am so compulsive. Could you cheat the gods and skip this step? Sure, 99 times out of a 100. But the downstream problems aren't worth the risk. If you made a batch and got staining artefacts, how would you know if you screwed up the staining step or the error was in not originally boiling the water. I am as frugal and lazy as the next guy but this is as cheap and easy as it gets in science. Find something else to eliminate in your life. Tom Phillips phillipst@missouri.edu Fri Oct 10

Agreeing with Tom Phillips, but with two additionals. I have had a couple students mix it up without CO_2-free water only to have them then come and ask me "So is this lead precipitate?" Yup, seems silly but in these cases they wind up with very rapid precipitation, which I assume was lead carbonate. If they waited long enough and were careful they could "stain" with the lead-free solution and avoid the precipitate since the lead seems to wind up on the bottom and sides of the containers. You can also make CO_2 free water with an autoclave. But since most autoclaves either reek or are heated with steam from decades old plumbing lines and reek, I've never trusted the results to be clean enough to try staining with. Sounds like an M&M poster to me! I just overfill the flask so it won't run dry, and I have plenty for the Pb-citrate and the NaOH wash water. Set it to boil, putter around cleaning optics, dishes, dusting, putting away glassware, sorting old samples and doing the 50,000 other little lab tasks until its thoroughly boiled. Richard E. Edelmann edelmare@miamioh.edu Tue Oct 14

I could not agree more, Jon. And would add: http://www.ou.edu/research/electron/bmz5364/sato.pdf that lasted without mishap for more than the estimated year at room temp, in the dark in 20 ml brown bottles with a PTFE lined screw cap. But, in spite of the chemistry, I still boiled the water. Cheers to all who are also weighed down by the vagaries of toxic lead that causes huge frustrated sighs of toxic gas. Fred Monson fmonson@wcupa.edu Tue Oct 14

Microtomy:
rotary microtome maintenance

We inherited 4 ancient (1960's) rotary microtomes (LEITZ 1212 and SARTORIOUS) but none of them works properly. After checkup, I found that all the problems were related to the specimen feeding sledge (reset)--either stuck due to long-time idle, or stuck due to a damaged thread. When sledge moved to the limit, the user might have put extra force on the wheel risking damaged threads. My specific questions are: 1) Is there any way to loosen the stuck sledge (apply special oil, or organic solvent)? 2) Are any special tools required to disassemble or assemble the parts? I found the most screws were too tight to unscrew. Any other considerations when putting things back (like calibrations, alignment)? ***Guosheng Liu guosheng.liu@usask.ca Wed Oct 29***

Use light penetrating oil to free the stuck parts—let in soak in for 30 minutes to overnight. And clean like mad. Most of the problem is going to be old dirt and old, stiff lubricants. No special tools are needed, just the usual screwdrivers, wrenches, maybe a pliers, and something to throw in frustration. If the feed threads are damaged, these can usually be fixed with a thread-chasing tool or a thread tap, if one can found with the right thread pitch. Phil Oshel oshel1pe@cmich.edu Wed Oct 29

Best known to me commercially-available penetrant for loosing threads and stuck gears on old instruments is "Kroil" from Kano Labs, but in the pinch automotive brake fluid and/or kerosene in combination with WD-40 would also do wonders. Wet generously and leave soaking overnight. Valery Ray vray@partbeamsystech.com Wed Oct 29

Electron Microscopy:
overriding vendor specifications

We're about to move into a temporary facility, and before doing so had the SEM vendor check the site to see if the vibration and electromagnetic interference was within spec. The site has excess vibration from 0.1-3 Hz, although it's not much over spec, but it was well out of spec for EMI. The vendor recommended installing an active field cancelling system. So, the architects got their own electromagnetic inspection and lo and behold, they said the site was OK, so we're not getting a field cancelling system. We're definitely having an inspection before re-installation of the instrument, but I'm a bit stymied as to what we'll do if it's very much out of spec. Has this happened to anyone and how did you handle it? ***Rosemary White rosemary.white@csiro.au Tue Oct 21***

I expect to be in the same boat in a couple of years. Architects don't like to listen to people who will be using their building. I suggest pointing out to the money people that the EM vendors know their instrument requirements and how to measure for them better than anyone else. From experience, if the building doesn't meet their criteria, then all performance warranties are void. If the instruments can't work properly because of the building, then they are just expensive paperweights. Fixing the problem after the fact is *much* more expensive than doing the job right in the first place. You might also arrange a meeting between the vendor people and the architect people to hash out the conflict. Both should want things to work right. Phil Oshel oshel1pe@cmich.edu Wed Oct 22

I don't know if you left out some details, but if it were me, I would not accept just a statement from the architects. I would ask who they had do the site survey, what are their qualifications, where and when were the readings taken, and most of all, give me a copy of the report. I should also point out that I would have watched the vendor do their site survey, and required a copy of their report, also. I have learned not to flat out accept this type of information, and to try to be a little bit scientific in reviewing the information, especially if some would be selling me something, or avoiding expense while providing something for me. Darrell Miles milesd@us.ibm.com Wed Oct 22

I confirm the many replies so far: The vendor will not have to show any resolution if their measurement shows high fields, they will ask you to sign a waiver and any performance specs are out the door. Try to get measurements over time, mornings, afternoons, evenings and also weekends: I worked in a big city struggling with fields due to work on power lines two blocks down the road (TEM system in basement on corner of building), Friday afternoon it was gone forever. A big EM vendor was about to spend a lot of money for a field cancelation/shielding solution in their factory when the problem was found to be wrongly connected room lighting on the other side of the building. This was found by the timing, 7am till 6pm during weekdays gave fields and this timing was traced to some room which was automatically powered down for safety reasons. So it could be that there are fields only once and a while, differing in strength, try to figure that out and then possibly trace down where it comes from by talking to building maintenance as they have a good feel for what happens when in the building.

For the measurements its best you get an independent expert, it will be worth the money. Alternatively ask your EM vendor to measure a few times during a full week. I think they should do

that anyway, put in some black box that measures everything for a week and then have it analyzed by a professional. Wim Hagen wim.hagen@me.com Wed Oct 22

I wouldn't put too much credence in the vendor's survey. The maintenance engineers have no special training or expertise in analyzing or mitigating these environmental problems. In our case, for TEM, it turns out the EMI from the power supply is well above the threshold that was imposed. I see no evidence that this affects our performance. I don't recall having to sign a waiver, but I may have forgotten. Phil Ahrenkiel phil.ahrenkiel@sdsmt.edu Wed Oct 22

Electron Microscopy:

turbomolecular pump vs. diffusion pump

I would like to hear advice on whether one should preferably choose a turbomolecular pump (TMP) unit over a diffusion pump for the camera chamber. So far, I have learned that a TMP will take a shorter time to pump down the chamber. May I ask if there are many other advantages of using TMP over the diffusion pump? Will it also reduce carbon contamination on the sample even though the sample should be in sample column area which is generally pumped down by an SIP? ***Yee Yan Tay rongchigram79@yahoo.com.sg Wed Oct 22***

If the turbo is backed by a scroll pump (dry): less hydrocarbon contamination, it is also better for any (cooled) cameras, you will need less heating cycles to keep the camera clean. In my experience any dry pump system will require less maintenance both on service and user level. Wim Hagen wim.hagen@me.com Wed Oct 22

I am actually getting ready to replace the diff pump on my antique Hitachi S-450 SEM with a turbo. Turbos have many advantages, no back streaming from the pump, you still may have back streaming from the roughing pump, though. Most modern turbo pumps are actually turbo-drag pumps, they have a molecular drag stage after the turbo stage which allows much higher backing pressures than a traditional turbo pump or a diffusion pump, this means you can get away with a cheaper rouging pump like a diaphragm pump or a scroll dry pump. Using these pumps mean there will be zero oil back streaming into the chamber. Also turbo pumps spool up much faster than a diffusion pump warms up. The little pump I am putting on my SEM spins up in about 1 minute, the diffusion pump takes about 20 minutes to warm up. There is also probably no need for cooling on the turbo pump unless you are cycling the chamber a lot. Oh, and the working fluid in the diffusion pump is incredibly expensive for a SEM; most use Santovac 5 which is something like $250 for 100 ml. Now for the bad... They are kind of delicate critters. A friend at Portland State University had a Leybold maglev pump grenade on him the other day. Ripped it right off the mount. Don't know why it happened, must have been a failure in the maglev section which caused it to crash. Turbo pumps are much less tolerant of accidents than a diff pump, you let air into it and bad things happen with a turbo, with a diff pump you just get a mess. There is also vibration; even the maglev pumps have some vibration. This is usually remedied with weighted isolation bellows. Jerry Biehler jerry.biehler@gmail.com Wed Oct 22

There are many advantages to using a turbo pump, but the main reason I do not like them is the maintenance question. If you have a lab hundreds of miles from your nearest maintenance technician, you are better off with a diffusion pump. The great thing about a DP is that anyone with a mild degree of skill can fix it when it stops working! I hate areas of a machine that you cannot fix with over the phone help, when a turbo stops it stops, and you have to wait for an exchange unit. A tricky decision, good luck! Steve Chapman protrain@emcourses.com Thu Oct 23

Electron Microscopy:

D-19 developer

Does anybody experience with the substitute of Kodak D-19 developer for Kodak microscopy film 4489? I bought a package from Plano (Ted Pella) for 1 gallon. But it is not clear to me if it is for preparing a stock solution or the working solution and is the handling exactly the same as for the old Kodak D-19? I really appreciate any comment. ***Anne Heller anne.heller@uni-hohenheim.de Tue Sep 2***

We use the replacement D-19 here. It seems to be easier to over-develop with the Photographer's Formulary version than with the Kodak D-19. But, it needs to be tested. Curiously, none of the EM supply companies I've spoken with have bothered to do this, they all say "it's a straight replacement, use it like you did Kodak D-19." Which is not unreasonable, given that the PF version is the same chemicals in the same proportions as the Kodak version, but still ... The replacement D-19 is compounded by Photographer's Formulary http://stores.photoformulary.com/formulary-substitute-d-19/ This is the same mixture as Kodak D-19, but packaged as separate components, which have to be mixed in a specific order when making the stock D-19 solution - directions are in the box. Philip Oshel oshel1pe@cmich.edu Tue Sep 2

For those who are interested (and have some time for that stuff), here is the recipe of the D19b: Grams for 1 liter final solution. To be diluted at 30–40 °C in distilled water to make a concentrated mother solution at 1/4 or 1/3. This mother solution will be kept in an air and light free bottle at <18°C and diluted as wanted for use. 2.2 gm Génol (hydrogen sulfate salt of the pronated N-methyaminopenol) 72 gm sodium sulfite, 8.8 gm hydroquinone, 48 gm sodium carbonate and 4 gm potassium bromide. Jacques Faerber jacques.faerber@ipcms.u-strasbg.fr Wed Sep 3

I have just sent a copy of original Kodak formula for D-19 to Anne. It was copied from over 40 years old Kodak leaflet delivered with autoradiography plates. The link is: <http://www2.biomed.cas.cz/~benada/D-19.pdf> We have been using it over 30 years with 1+2 dilution (standard contrast) or 1+1 dilution (high contrast) for Kodak 4489 or Agfa Scientia plan films exposed at 80 kV. It slightly differs from Jacques formula for D-19b. Oldrich Benada benada@biomed.cas.cz Wed Sep 3

Thanks for the link. I asked myself from time to time why the "b" on the name D19-b. What about the "D19-a" and here we have the answer. But the differences between both are small. They have the same Genol/hydroquinone ratio, so the same developing characteristics on grey levels and contrast rendering. As the D19 has less accelerator, more preserving agent and less "anti-voile" (what's the name in English?), it gives probably a less aggressive development and is more tolerant on developing time variations. In comparison the D76, which is for fine grain and low contrast, has 2 gm Genol, 5 g hydroquinone, 100 g sodium sulfite and no sodium carbonate. Probably the evolution to the "b" version was made to gain some contrast and/or to need a shorter developing time. Jacques Faerber jacques.faerber@ipcms.u-strasbg.fr Thu Sep 4

Thank you for all who responded to my question. In the meantime I tested the substitute for Kodak D-19 from Ted Pella for 1 gallon. It gives 1 gallon stock solution. For Kodak plates 4489 4 min in 1+2 dilution the result is fine. It is a really a substitute for Kodak D-19. Anne Heller anne.heller@uni-hohenheim.de Wed Sep 10

TEM:

burning objective aperture strips

Is there anyone out there that still burns objective aperture strips for their TEMs? I plan to try this with a Denton DV 502A evaporator and an old Hitachi 7600 strip (not thin foil). My questions are: At

what vacuum do you burn the aperture? How long do you burn the aperture and at what current? ***Michael Delannoy mdelann1@jhmi.edu Thu Sep 4***

The best way to heat up your aperture strip is to mount it so that the aperture area rests between two pieces of platinum. Using a platinum boat does not usually provide an even level of heat along the aperture area. Increase the current slowly and the aperture itself will start to glow. Continue until the aperture is an orange-red, stop, and watch the dark contamination around the apertures gradually disappear. Many people will suggest white heat, but in my experience this has a high possibility of damaging the aperture shape after one or two cleaning sessions. Orange-red is enough to obtain a clean aperture, and this level of heat will work for a number of cleaning procedures before any noticeable distortion of the apertures themselves. The current drawn will vary on the contact between the aperture and the platinum supports. Slowly increasing the current will ensure you do not supply too much current and damage the aperture strip. Steve Chapman protrain@emcourses.com Thu Sep 4

The higher the vacuum the better, but at least 10^{-6}. I just go to bright red hot or orangish and then let it cool. Philip Oshel oshel1pe@cmich.edu Thu Sep 4

Just burn your aperture plate by holding it in the blue part of a gas flame by means of forceps. Shape of the hole doesn't matter much. Peter Elbers p.elbers90@upcmail.nl Sun Sep 14

If the aperture is Molybdenum, then as alternative to burning you can soak it overnight in warm (30C to 40°C, candle warmer works perfectly here) solution of 80% Micro-90 in 20% deionized water (DI) water, followed by 20 min ultrasonic cleaning next morning in the solution of 5% Micro-90 + 95% DI water, followed by dipping in 99.9% IPA "low residue analytical grade for chromatography," followed by blow-dry by clean dry air, dry nitrogen or clean-room-approved duster. This procedure also works for anodes and beam-limiting apertures of SEM, if they are made of molybdenum. Valery Ray vray@partbeamsystech.com Sun Sep 14

TEM:
power backup

We are in the process of searching for alternative systems to replace our aging Toshiba UPS 1600XPs, we use them to back up our transmission electron microscopes. Can anyone suggest a comparable system that works for you? ***Xinran Nick Liu xinran.liu@yale.edu Thu Sep 11***

At a past job, I tested and subsequently had installed UPS/power conditioning solutions from PowerVar. I found them to have good prices, small units, and a range of battery capacity options. We were looking protection against momentary power loss or for just a few minutes of run time for SEM's and FIB's, to allow for gracious shut down. The units worked well and did in fact come into action more than once. Larry Scipioni les@zsgenetics.com Thu Sep 11

TEM:
Wehnelt aperture selection

I am changing the filament for a Philips CM20 TEM, and just found we have several different Wehnelt Apertures with various hole sizes in stock. What's the difference for different sizes of the apertures? How do I choose one? ***Qiang Wang 13qw9@queensu.ca Mon Sep 15***

For Philips CM series, the following Wehnelt diaphragms are recommended. Standard tungsten filament: 0.5 mm; LaB_6 filament: 0.3 mm Oldrich Benada benada@biomed.cas.cz Tue Sep 16

TEM:
digital counter for filament usage

Is there any time counter for filament on/off available with FEI or third party? ***Ravi Thakkar ravi.thakkar369@gmail.com Fri Oct 17***

When the HT is turned on, the 12-volt filament supply is powered up. If you take a 12 volt timer and tie it to the power supply, it will give you the HT ON time. Since we turn the HT off between users, it served us well as a usage timer. Henk Colijn colijn.1@osu.edu Fri Oct 17

Why do you ask? Do you have a W gun or a field emission gun? If you are seeking to track filament lifetime, that can probably be done rather easily if you can find the right connection to a circuit showing when the high voltage is on. I don't know why you would want to do that with a field emission gun. If you are seeking to track hours for billing I can understand that and there are multiple ways to do it. You might be able to tie into a circuit that shows voltage when the high voltage is on. There are hour meters available through McMaster Carr and other outlets than run when a voltage is applied to them. We have considered having a program run in front of the user interface so that users need to log in to clear it and access the UI. That could give us a lot more information. We have also heard of someone putting a box inline with the monitor power. The monitor can only be energized when someone logs into another monitor computer. Warren Straszheim wesaia@iastate.edu Fri Oct 17

I assume your FEI scope has a computer interface - I keep track of filament use with a Macro Express macro hooked to a command icon (also through macro express) for our JEOL 5600. When I click the icon, the macro starts/stops the microscope high tension and writes a timestamp to a text file, calculating elapsed session time and total beam time when the HT is turned off. Fairly simple, really. I can send you details if you're interested. Macro Express isn't free, but well worth the trivial amount it costs. It automates all kinds of things I do routinely on scope computers and elsewhere. See http://www.macros.com/. Jim Ehrman jehrman@mta.ca Fri Oct 17

SEM:
filament problem

The FEI Quanta 200 showing the message "filament blown off" on the contrary they are able to see the filament emission but the filament emission signal turns from green to red. The error occurs after some time when the HT and filament was switched on. It is almost 3-4 four months now they are getting such erratic problems. Not able to trace out the reason for this. Is it suitable to analyze the samples in such conditions? ***Rashmi Mehata rashmi_mehata@yahoo.com Wed Oct 1***

I would guess that there are a number of reasons why you have this problem. Others may help here? However, provided you have stable emission and the focus is also stable will have no problems with your work. Steve Chapman protrain@emcourses.com Thu Oct 2

I did not have a chance to dig into Quanta 200, but based on typical architecture of SEM detection of blown filament should be made by the high voltage power supply (HVPS) - usually a pricey item to repair. Can't be sure of exact multifunction, but if parameters of filament current, extractor/anode currents, and the image are stable, then I'd run it until the HVPS quits completely. Valery Ray vray@partbeamsystech.com Fri Oct 3

SEM:
high-tension cable

The high-tension cable in our JEOL 5600 LV is not working and would like to replace it. Does anybody have a positive experience with a company that can do this with low cost, in the USA or in Europe? ***Yorgos Nikas eikonika@otenet.gr Fri Sep 19***

Servicing microscope for many years in Europe, I would talk to organizations that service hospital equipment like x-ray machines. In those days it was possible for these people to remake the cable if I provided the connections. Steve Chapman protrain@emcourses.com Fri Sep 19

What about the high-vacuum seal on the cap of the microscope. Does this present a problem for the replacement of the cable? Yorgos Nikas eikonika@otenet.gr Fri Sep 19

Try these three: http://www.dielectricsciences.com/index.html http://www.parkermed.com/products http://www.claymount.com/en/ Vitaly Feingold vitalylazar@att.net Fri Sep 19

SEM:
CRT replacement

A few months ago our lab acquired an old JEOL IC-848A SEM. We found that the CRT is no longer working (the yoke coils are shorted out). The CRT is a Toshiba, Model #E2755B7, with a Totoku yoke, Model #EYS-03-0600. We would like to replace this CRT. Online searches have shown one or two places which have them, but those that do are without a yoke. Does anyone know where to find a complete replacement CRT (or yoke)? Or, if that's not possible, what a compatible replacement would be? ***Julius De Rojas jcderojas@ucdavis.edu Wed Sep 24***

I am not that familiar with JEOL specifically, but done fair share of upgrades and repairs. Does this monitor display regular RS-170 video signal (analog TV standard?), or does it monitor a proprietary feed? If monitor works with standard TV signal then any LCD TV monitor could be plugged in instead; if signal is not standard then decent video input card (like Epiphan VGADVI for example, or something slightly more sophisticated in tough cases) could be used to digitize the signal and display it on PC monitor. Valery Ray vray@partbeamsystech.com Thu Sep 25

SEM:
asphalt

Can I study asphalt under the scanning electron microscope in high vacuum mode and how they are being studied? ***Hadeel hadeelzh@yahoo.com Mon Sep 15***

It seems a little strange that you would ask the microscopy community how asphalt is being studied. I assume that you would have a question that you would like to answer rather than asking about others questions and techniques. Thin layers of asphalt on aggregate might be studied at high vacuum. You would need to take normal precautions for dealing with insulating samples, i.e., low voltage and/or a metal coating. You might also be prepared for some contamination in the chamber. You might volatilize some organic components that would condense within your chamber leading to a need for more frequent cleaning. We tried looking at a polished section of asphalt in a high vacuum SEM years ago. We had problems getting to operational vacuum. Between volatile components and porosity, the sample would not pump down in the allowed time. We ended up buying an SEM with variable pressure capability. We did not have to pump to such a high level so we could reach operational vacuum quicker. Variable pressure (VP) mode meant we did not have to contend with charging. Also, we were in a vacuum mode where the residual gas helped sweep away the components that came off the sample. We did not have to worry about them depositing in the chamber. I recommend that you locate a VP-SEM if you plan to do much asphalt or concrete work. Warren Straszheim wesaia@iastate.edu Mon Sep 15

MT

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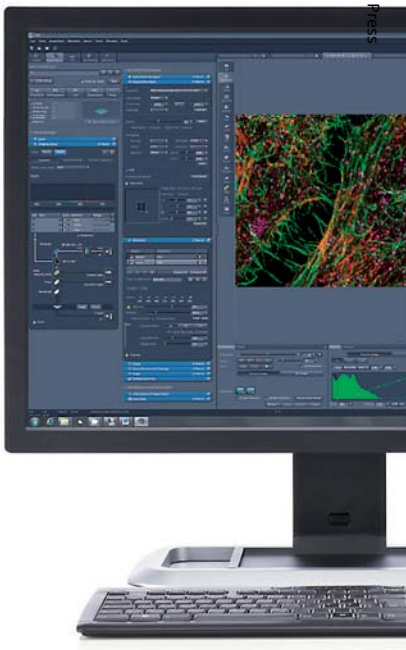

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