

NetNotes

Edited by Thomas E. Phillips

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Selected postings from the Microscopy Listserver from March 1, 2018, to May 2, 2018. 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: osmium and uranyl acetate

My first question: Is osmium better purchased made up in vials or made from crystals in the lab. I prefer the vials. I feel they are safer and the solution is protected from degradation. Second question: Does uranyl acetate (UA) power degrade over time? We have a bottle that is 2+ years old, purchased from Polysciences. JoAnn Buchanan buchsmith@gmail.com Wed Mar 7

Osmium: I have the impression that 4% OsO₄ (stored in sealed glass ampoules under nitrogen at 4° C) stains less strongly after storage for over 20 years; the crystalline form works well after storage for more than 20 years. Small tip for dissolving: I snap off the tip of the glass vial, add the water, seal tip with a little amount of Parafilm/Nescofilm and sonicate in an ultrasonic water bath for approximately 5 minutes in a fume hood. Uranyl acetate: I use UA bought in the early nineties, works perfectly. Peter Heimann peter.heimann@uni-bielefeld.de Thu Mar 8

In our hands, we always work with 1 g Osmium crystal (sealed ampoules). As we have a substantial sample preparation load in the lab, the final solution (1-2%) is consumed in the next month approximately, but I suppose that it is very stable. In uranyl acetate case, we have been using the powder from a bottle older than 20 years without noticing any degradation related to a new one. In my opinion, the two substances are remarkably stable over time. Juan Luis jlribas@us.es Thu Mar 8

I want to share my experience with UA. About ten years ago, I inherited a bottle of UA dated 1960s. I used it to do grids staining and negative staining. It did stain without any noticeable problems, but then I got a new bottle UA of EMS from another PI, with which my staining looked fresher and less background. The bottom line is the fresh US does give better staining. Your two-year-old UA should be fine. Gang (Greg) Ning gxn7@psu.edu Thu Mar 8

Specimen Preparation: non-crystalline clay or putty for X-ray diffraction

I have a request that maybe your friend down the hall who works in X-ray diffraction may be able to answer. I am working on some small metallic glass samples trying to get an X-ray diffraction pattern that represents the metallic phase. The samples do not fit my sample holder so I machined a special holder but this still requires some kind of mounting material to hold the sample. My clay idea works well, but I get X-ray peaks from the clay. So I am looking for a clay or putty material that is noncrystalline. Roy Beavers rbeavers@smu.edu Fri Apr 27

Try silly putty or mounting putty: <http://www.crayola.com/faq/another-topic/what-are-the-ingredients-of-silly-putty/>. Silly Putty is made primarily from silicone and color pigments. Silly Putty was discovered in 1943 by James Wright and introduced to the public in 1950 by Peter Hodgson. Crayola acquired the exclusive manufacturing rights to Silly Putty in 1977. The formulas are considered proprietary. Or from Walmart: Duck Mounting Putty, Removable, 56G, 12PK/CT, BE - DUCPTY2CT Mounting Putty is ideal for temporary mounting of paper items such as posters, charts and decorations to nearly any surface without damage

to the paper item or surface you are mounting it on. It provides a safe alternative to tape, nails, glues, tacks and staples. Mounting putty is nontoxic and easily removable and reusable. Conforms to ASTM-4236. Edward Basgall ejb63@drexel.edu Wed May 2

Image Analysis and Processing: vector graphics for images

We are interested in updating our photo editing software, with an eye primarily on good vector graphics for annotation purposes. I would appreciate receiving thoughts and suggestions; what do you use, what do you like about it, as well as what may be a little tricky/unsatisfactory (if anything) about your program. Chris Holp holpc@firstenergycorp.com Fri Apr 6

I find Adobe Illustrator to be my favorite choice. Although it costs money, everything is well-automated and there are tons of help websites, tutorials, and videos online so that I never need more than a minute or two to figure out a new command. The ability to do my annotations FAST more than makes up for the yearly cost of the Adobe CC subscription, given my hourly charge out rate. If you want free, Inkscape seems good, but I've not bothered to learn it in detail. I do all of my analysis in MATLAB and use commands like >save (gcf,'filename.pdf','pdf'); to save my MATLAB figures as PDF, which Illustrator will read natively as vector graphics. That's the fastest, most efficient way to turn data into figures I've found. I imagine Python, etc., have similar tricks using either PDF or SVG. No financial interest—just a satisfied customer. Chad M. Parish parishcm@ornl.gov Mon Apr 9

Instrumentation: dealing with old computers on microscopes

I have been dealing with an issue that quite a number of computers (that are hooked up to TEM, SEM, and other tools) get outdated (and obsolete) while tools are more or less in good shape. When I contacted each manufacturer for a new computer, they usually recommend a more modern versions of software with a newer computer that easily cost over \$10K. (They simply don't deal with Window XP based computer anymore.) I have more than ten tools whose computers are almost ten years old and am looking for a more affordable way to replace these computers. I wonder if anyone who deals with the same issue could enlighten me. In-Tae Bae itbae@binghamton.edu Sun Mar 25

There is a good reason why OEMs don't want to deal with XP computers - replacing PCs is more straightforward and easier than maintaining older models, and being money-making organizations OEMs must recoup costs of developing and manufacturing upgrades with associated overhead. You mentioned the price of computer/SW upgrades is between US\$10K to US\$20K, this is quite reasonable, considering the amount of design effort put into it. That being said - you can reduce the cost of dealing with forced obsolescence and refusal of service by trading money for maintenance effort. First and foremost, make backup copies of hard-drives on your PCs, since software is the most "non-replaceable" part of the instrument and the HD failure is not "if,"

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but “when” event. Then get online, scour websites of second-tier sellers, get necessary computer hardware (motherboards, processors, memory, peripheral cards, etc...), and build backup PCs for every instrument you have. If you have the expertise and time to do the work yourself, then virtually any PC can be rebuilt for much less than \$1K in cost of parts. If you use one of the decent third-party support organizations, then cost of labor/travel would increase overall price but is likely to be still lower than the price of new replacement PC from the OEM. Alleged problem with XP network security due to dropped support is easy to bypass by placing a cheap Win10 PC, or a Linux box, as a firewall between your XP PC controlling the instrument and institutional network; images are passed through from instrument to network, but any other access to/from XP PC is blocked. Truly proprietary cards in PCs do pose some problem, although not all instruments have them. If there is such a card found, then depending on the level of technical expertise available you can either (a) try buying a card from OEM or third-party support organization, if available, or (b) monitor second-hand equipment market and snatch a PC from similar instrument when it comes up somewhere, or (c) rely on component-level repair to restore original card when and if it fails, (d) clone the proprietary card, many of them are quite simple, or (e) bite the bullet and upgrade PC by paying the OEM - which most of the academic and institutional users do anyway. **Valery Ray vray@partbeamsystech.com Mon Mar 26**

I'm in the same position with one of our confocals, and it's not as simple as not being able to replace the computer because it's too expensive. The system has proprietary circuit boards in the computer, which cannot be moved to a new(er) computer because the bus architecture is different (and obsolete). So before simply upgrading a computer — even to a newer, old model — check if your system has such boards in the current computer. If so, you might have to try to find “new old stock” obsolete computer boards that are better but still use the old architecture. (Got any 20 or 30 year old relatives who were big into building their own computers when they were young teenagers?) Maybe someday soonish there will be TV shows about collecting and restoring old computers, like they have for cars. **Phil Oshel oshel1pe@cmich.edu Mon Mar 26**

We just linked the old XP machines to another computer running Windows 7 which is secure. I don't know exactly how to do this - check with your IT department. They can probably fix you up. **Carol Heckman heckman@bgsu.edu Mon Mar 26**

Many times the issue with the custom PC cards is that they plug into an outdated bus. There are companies that still make motherboards and chassis components for the older interfaces. If the computer is failing, but the cards are still OK, you can get a new PC system and “just” plugin the cards. It may require some fiddling to get things to work, but at least you can get a few more years from your system. I just did a web search and found “Nixsys.com” that sells ISA bus PCs. “Cyberresearch.com” also has passive backplanes with ISA slots. There is no motherboard per se; you add a processor card to the system. (I have no interest in either company) **Henk Colijn colijn.1@osu.edu**

On a related note, our new (2016) Hitachi SEM and Oxford EDS are banned from accepting Windows 7 updates (by Hitachi) - updates beyond the Windows installation they provided will break the software. I have them connected via a router, with both being denied Internet access by giving them a bogus Default Gateway in the Local Area Connection setup. Another computer (with Internet access granted) is also connected to the router, and we get data from the two instruments out to the real world through drive shares. Not elegant, but it works. And I have to say that having two computers that never nag about updates or suddenly become broken when M\$ screws up some driver file that the instrument depends on is quite refreshing! **Jim Ehrman jehrman@mta.ca Mon Mar 26**

The tricky thing is that even Windows 7 will not be supported (by MS) anymore in 1 or 2 years' time. We will not have fun with “old” computer systems. **Reinhard Rachel reinhard.rachel@biologie.uni-regensburg.de Mon Mar 26**

On a lightly different matter. The problem of out of date EM computers has been going on for many years and when training service technicians I encouraged them to educate the customer on this. At the time of an EM installation the laboratory will usually be flooded with PC, so we suggest that when replacing that equipment the laboratory keeps a couple of the redundant units complete with keyboard and mouse as back up spares. How often when training operators did we have a failure, fan, transformers, keyboard etc, when with redundant PC available we were up and running again in no time. Being prepared is a good idea. **Steve Chapman protrain@emcourses.com Sat Mar 31**

Good advice, but even better than Norton Ghost is cloning. I have had service engineers “ghost” hard drives many times, and every time the ghost was needed to restore a system, it failed. For less than the cost of Ghost, you can buy a new hard drive, clone it, and keep the clone around for when something happens to your system disk. I have never seen a clone fail, plus you can test it right away to see if it is good. One note: Acronis recommends never leaving the cloned disk and the original disk connected to the bus; attempting to boot the computer with both drives connected can corrupt the boot sector of the new clone. **A. John Mardinly john.mardinly@asu.edu Sun Apr 1**

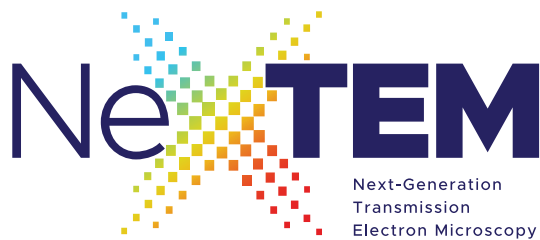
TEM: high tension (HT)

Can I please get your advice on a problem with the HT on a Philips CM100? When I press the HT On/Off button to turn on the high tension, I got no response, i.e., I cannot turn on the high tension. The vacuum is good, both HiV and UHV lights are on. I pulled the power supply (A7) and found that the fuses are intact. The voltage going into A7 is 227V. I also measured the resistance across the HT On/Off push button. It is 12 ohms when pressed and 0 ohms released. Is there anything obvious that I have missed? **Wai Pang Chan wpchan@uw.edu Thu Apr 19**

There is a security switch “S34” on CM100. You can find it on the left side of the column on the lifting assembly. Check it if it is closed. If it is open, the HT cannot be switched on. **Oldřich Benada benada@biomed.cas.cz Fri Apr 20**

Thank you for the helpful tips. Here is the follow-up.

1. All the power supplies in the electrical closet are on except A7 (24V h.t.) and A8 (24V fil.). When I pushed the HT on/off button, A8 came on and the red LED of A9-X2 was on. Seems like it indicates a problem with the HT oscillator. After about 1 minute, both went off and HT cannot be activated.
2. S34 is closed during operation. However, it does not disengage when I lifted the gun. This could be a problem, but I don't think it is related to not being able to turn on the HT.
3. S33 is also closed during operation, and it is open when the gun is lifted.
4. The four fuses behind the Right Hand Panel are intact. They are labeled Z201-4.
5. Upon restart, the filament type defaults to LaB₆. This should not prevent activating the HT or the filament, even if a tungsten filament is installed.
6. Wehnelt protection circuit is not triggered. There are no red LED lighted up for any parts of A9, except for X2 mentioned above.
7. Restarting the TEM does not help in turning on the HT.
8. On our CM100, HT defaults to 40kV upon startup. I tried various values of kV but still couldn't turn on the HT. **Wai Pang Chan, wpchan@uw.edu Tue Apr 24**



WORKSHOP

Beyond Current Limits of Resolution, Environments, and Data Analysis



DATE: *October 8–10, 2018*

LOCATION: *Discovery Hall
Pacific Northwest National Laboratory
Richland, Washington*

ORGANIZERS: *Steven Spurgeon, PNNL | Mitra Taheri, Drexel University*

EMAIL: *steven.spurgeon@pnnl.gov*

WEBSITE: *https://pnnl.cvent.com/nextem*

OVERVIEW: Pacific Northwest National Laboratory is pleased to host the inaugural **Next-Generation Transmission Electron Microscopy (NexTEM) Workshop**. This event will include three full days of invited and contributed sessions on topics including high-resolution imaging and spectroscopy, in situ/operando microscopy in extreme environments, and computational methods for data analysis. NexTEM will bring together experts in cutting-edge imaging methods, technique development, and data analytics to identify emerging pathways to more efficient and insightful materials analysis in real-world conditions.

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- ▶ Image simulation tools to aid the interpretation of experimental images and spectroscopy.

CONFIRMED INVITED SPEAKERS:

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Argonne National Laboratory

Robert Klie
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Sandia National Laboratories

Renu Sharma
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Forschungszentrum Jülich

Sergei Kalinin
Oak Ridge National Laboratory

PNNL-SA-134561



TEM:**oil diffusion pump (ODP)**

I came in this morning and observed the following error message on our Philips CM 120: ODP Circuit. Primarily what is happening is that, upon start-up, the system gets hung up at the very first step of the vacuum sequence. I am polling the expert audience to determine if anyone has encountered this issue and to learn what was done about it.

Dave Rademacher drademacher@luc.edu Wed Apr 4

In the Manual, there is written "ODP Circuit - contact service department." We had this problem a long time ago, and we have solved it by buying a new ODP heater. We bought a new one from a company in Germany. Unfortunately, I do not have the details at hand now. The heater can be replaced by the user. It is not a difficult task. P.S. Just now I have found the old broken heater ring from our Philips CM100. Its specification is "Chromalox Cat No. KB15 Volts 210 JB Watts 450." The heater can be found on the Edwards Webshop: <https://shop.edwardsvacuum.com/products/H01700186/view.aspx>. Please, look at your diffusion pump type if this specification is also valid form your pump. **Oldřich Benada benada@biomed.cas.cz Thu Apr 5**

It sounds like a Water Chiller problem. Your chiller is probably making hot water, maybe good for tea but not for your microscope. **Greg Hendricks gregory.hendricks@umassmed.edu Wed Apr 4**

I used to look after two CMs until very recently. I think 'ODP circuit' means the heater's electric circuit is open (i.e., likely the heater element has failed, as someone else mentioned); 'ODP Water' is when the water temperature just after the ODP reaches 60 degrees C, i.e., water flow or chiller issue; 'ODP Oil' is triggered when the heater has been running for a while, but the oil hasn't reached target temperature- I've had this with a working heater but with a colder than usual water supply at higher than normal flow rates; but it could also be an issue with the heater. **Ben Micklem ben.micklem@pharm.ox.ac.uk Thu Apr 5**

Common problems in order of probability: 1) open ODP heater 2) poor connection at ODP heater terminal (ceramic block located near the bottom of ODP) 3) sticky ODP relay in MS unit (power cabinet, right side, one of large relays). Watch vacuum screen on data monitor during vacuum system startup. You must hear relay clicking simultaneously with ODP symbol highlighting shortly after vac. system start, as soon as P2 reading drops below 38. (assuming room is quiet) 4) defective water safety thermostat switch on water line coil (middle of ODP) or poor connection of it. Look at connecting wires; they can be burnt if touching the bottom of ODP. Other causes are possible but unlikely. **Vitaly Feingold vitalylazar@att.net Fri Apr 6**

SEM:**imaging asphalt (bitumen) without cryostage**

A researcher would like to image asphalt/aggregate interfaces, but we have no cryostage, only a low T stage for the ESEM. Has anyone attempted this at ambient T or just below? Any advice on how to proceed? **Jerry Anzalone gcanzalo@mtu.edu Fri Mar 23**

We have looked at asphalt before in variable-pressure mode. We tried looking in hi-vac mode, but the chamber took hours to pump down. I think the outgassing may have been as much due to porosity as to volatility of the asphalt. However, I would want to use VP mode to keep the chamber flushed out. I would not want any volatile goo depositing within the chamber. We have a Quanta FEG-SEM with environmental mode. Our Peltier stage is not at all large enough to handle a slab of asphalt concrete. We simply looked at the slabs at ambient temperatures. You may find that the binder smears/migrates over the aggregate. It will probably be a problem during polishing, but even if you get a good polish, you will still find the oils migrating in the SEM. (A cool stage would help.) You may find it necessary to keep moving to fresh areas. It would not be too noticeable at low

magnifications, but it will probably be inescapable at higher mags (several hundred times). **Warren Straszheim wesaia@iastate.edu Fri Mar 23**

Have you considered using an X-ray microscope? You can run scans at room temperature in air. **Aya Takase aya.takase@rigaku.com Sun Mar 25**

SEM:**filament problems**

We were recently examining a box of Amray SEM W filaments and found what we think is an odd feature on some of them. The filament is your basic loop or hairpin filament, but some have a small needle extending from one side of the wire at the apex of the point. The needle would point down the column and has the look of purposeful manufacturing. It's been suggested these are field emission filaments. Our Amray is NOT set up for field emission. We are having trouble with filament drift in use and short lifetimes, but we are reluctant to use these. I'm open to thoughts. **Frank Karl frank_karl@ardl.com Wed Mar 14**

A lot of years ago, Siemens manufactured for the ELMISKOP TEMs cathodes with this kind of "tip". In German, it's called "Spitzenkathode." Theoretically, it should have some extra luminosity and may deliver—since the beam comes from a very small origin—more coherent electrons. It is known that these tips need a very good vacuum at the cathode. Otherwise, you will round the tip through ion bombardment or burn the filament very easily. I suppose it is kind of unstable during heating up and will shift a lot. In my opinion, it should be centered and mounted like a LaB₆ cathode to bring all the advantages. Lifetime had been only part of what is known from a "normal" W filament, maybe 10 hours or so. **Stefan Diller diller@stefan-diller.com Wed Mar 14**

It sounds like those are pointed tungsten filaments. In the days of prehistory (aka pre-FEG) to get a high brightness/coherence source people used pointed W cathodes. To get the tip of the needle hot enough to have reasonable emission, the hairpin ran very hotly with the corresponding reduction in lifetime. If I remember, cathode lifetimes of ~10 hours were common. They would have been used for high-resolution SEM or high-coherence TEM imaging. **Henk Colijn colijn.1@osu.edu Wed Mar 14**

There is extensive discussion of pointed filaments in John Spence's classic textbook: "Experimental High-resolution Electron Microscopy", Oxford University Press, 1981 pp. 258-261. **John Mardinly john.mardinly@asu.edu Wed Mar 14**

EDS and XRF:**method induced differences**

The story goes, there once was a fella who ran EDS on a rubber sample and found less 1% (semi quant mode). But another lab under the corporate umbrella used XRF as well as ICP and found 5%. I got my theories and hand waving, but I can't help my co-worker out. I'm open to theories. What does the collective wisdom of the microscopy community say? **Frank Karl frank_karl@ardl.com Tue Mar 27**

You didn't say, but I am guessing you meant they were analyzing for sulfur. I will presume so for this discussion. If you were measuring S in rubber, that would mean a lot of C in the matrix. I would really doubt the C number from semi-quant mode. C may have been dreadfully inflated and thus would have diluted the S content. Some systems may be better than others, but I am always surprised when the C comes out even halfway close to the right amount in semi-quant mode. I would rather try to measure C(+H) by difference. That would mean going somewhat beyond semi-quant mode. You would have to turn off normalization and calibrate your beam intensity to that used to collect the standards. Specify C as the element to be determined

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by difference. I think the resulting S number would be much more reasonable. (At least it was when I did my MS work nearly 40 years ago. They accepted it for my thesis work.) I know how to do that on Oxford equipment today, and I had done that on Noran equipment for my masters. I don't know how the others would set that up. **Warren Straszheim** wesaia@iastate.edu Tue Mar 27

The Great Lego Microscope Competition

Two years ago, Tina Carvalho put on the list server "How do I make my smart phone into a microscope?" She got lots of replies. I have been collecting quite a lot of them. My favorites will be at the Outreach Booth at M&M in Baltimore in August. Some work better than others, and a lot of the results depend on how good your smart phone camera is. I still use the Echo Wooden Microscope with my smart phone when I take a plankton tow. I wondered how difficult it would be to make a Lego version. I borrowed some Legos from my son and made one. However, the permutations of what is possible with Legos seemed extensive, so I am putting forward "The Great Lego Microscope Competition." Place: M&M Meeting, Baltimore 2018, Outreach Booth. Lenses: The designer has to take care of this. Simple lenses work fine for this project. Technical Legos can be used. Prizes: Yes. I will have the version I made, and I hope I have given you enough time to put something together to bring to the meeting. I will bring some Legos to one of the stations in "Microscopic Explorations" (used to be Family Affair) on the Wednesday afternoon to make a Lego Microscope. While I am on the subject of Microscopic Explorations, which is for delegates, their families, and friends, this year we should have "How to put together a Foldscope, and activities to use with the Foldscope including a couple of solve the mysteries." All attendees should take away their own put-together Foldscope and be comfortable using it. **Elaine C. Humphrey** ech@uvic.ca Thu Mar 29

A Lego microscope would be cool. In 2017 there was a push for the Lego factory to make Lego transmission electron and scanning electron microscopes (not working of course). People could vote for it. Here is the web page: <https://ideas.lego.com/projects/102b2832-4574-4870-95a0-8698211d3fdf>. I'm not sure what happened to the idea—haven't seen any in the stores—but it would be neat to have in the lab. **Lita Duraine** duraine@bcm.edu Fri Mar 30

I challenged my son to make some Lego scopes about 20 years ago. Here are the results: <http://www.mta.ca/dmf/lego.html>. Except for more appropriate stickers on the parts, I think they came out pretty well. Sadly, they often get more attention from visitors in the lab than the actual equipment does... **Jim Ehrman** jehrman@mta.ca Wed Apr 4

Here are the instructions to build a Lego highbase Titan Themis we made for the launch of our microscope: <https://ulsites.ul.ie/mssi/sites/default/files/Titan%20Themis%20Instructions.pdf>. For those who are interested, here are the two microscopes being built: <https://youtu.be/x6ArO0-CNu4>. The launch video of the microscope: <https://youtu.be/PADirETav5k>. To find those more difficult to source Lego pieces, I found bricklink.com to be very useful. **Andy Stewart** Thu Apr 5 Thu Apr 5

I do need to point out that this competition is about making your smart phone into a microscope and needs to be a working model. That being said, what a fun way to look at the instruments in your lab. Thank you for sharing, James, and thank you, Lita. Roseann Csencsits sent me this link: <https://ideas.lego.com/projects/fcce15cd-27e0-405b-990b-681b7787fbc6>. I hope to see lots of wonderful models in Baltimore in August. **Elaine C. Humphrey** ech@uvic.ca Thu Apr 5

NCI Request for Information on Development of an Imaging Data Commons

As part of its efforts to increase access to cancer data and data analysis tools, the National Cancer Institute is establishing a Cancer

Research Data Commons (CRDC). Imaging is a crucial area for analysis and discovery in cancer, so part of this effort is the development of an Imaging Data Commons (IDC). Given the breadth of the data and tools in cancer imaging, we are seeking input from the research community to ask their thoughts on the data, tools, and features they feel are important to include in such a data commons. To engage potential contributors, a Request for Information (RFI) was released to solicit this input. I've included below the text of a flyer we're distributing to announce the RFI, including the URL to the RFI and the email for questions/responses. You can also contact me directly with any questions. If you are aware of similar existing efforts, please feel free to reference those in a response. If you have any questions regarding the RFI, you may send them to either the NCIIDCRFI@mail.nih.gov address or jetsd@nih.gov (they're both me). Thank you in advance for any input. Best regards, **Steve Jett**

The NCI is inviting comments and suggestions on the development of the NCI Imaging Data Commons (IDC), a node of the Cancer Research Data Commons. The IDC will provide: · access to image repositories · analysis tools · scalable computing resource · a cloud-based, collaborative environment. To best serve the needs of the cancer imaging community, we are seeking input from potential users of the IDC to determine the best features to include in an IDC prototype. All stakeholders involved in cancer imaging are invited to respond to this Request. More details about the RFI and how to respond can be found at <https://grants.nih.gov/grants/guide/notice-files/NOT-CA-18-060.html>. The deadline for submission is May 4, 2018. For any questions about this request, please contact NCIIDCRFI@mail.nih.gov. **Stephen D. Jett, Ph.D.** stephen.jett@nih.gov Sat Apr 14

Editor's Note: The date has passed, but this is potentially very important, and we are publishing this note to increase reader awareness of the project.

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Microscopy Society of America Awards

Nominations are now open for the Microscopy Society of America Annual Awards. The awards process is one way in which the Microscopy Society of America recognizes the significant and diverse contributions that individuals make to our field. Deserving nominations for consideration should be submitted electronically no later than October 31st, 2018 to:

AssociationManagement@microscopy.org

The Main Society Awards Are

Distinguished Scientist Awards

These Awards recognize preeminent senior scientists from both the Biological and Physical disciplines who have a long-standing record of achievement during their career in the field of microscopy or microanalysis.

Burton Medal

The Burton Medal was initiated to honor the distinguished contributions to the field of microscopy and microanalysis of a scientist who is less than 40 years of age on January 1st of the award year. (Please note the change in the selection criterion regarding age.)

Outstanding Technologist Awards

These Awards honor technologists from both the Biological (Hildegard H. Crowley Award) and Physical Sciences (Chuck Fiori Award) who have made significant contributions such as the development of new techniques which have contributed to the advancement of microscopy and microanalysis.

Morton D. Maser Distinguished Service Award

This Award was initiated to recognize outstanding volunteer service to the Society as exemplified by Mort Maser, who served the Society for many years with great dedication. This award is made to honor an MSA member who has provided significant volunteer service to the Society over a period of years.

The Albert Crewe Award

The Albert Crewe Award was initiated to recognize the distinguished contributions to the field of microscopy and microanalysis in the physical sciences of a postdoctoral fellow of not more than 6 years' standing (since doctoral graduation).

The George Palade Award

The George Palade Award was initiated to recognize the distinguished contributions to the field of microscopy and microanalysis in the life sciences of a postdoctoral fellow of not more than 6 years' standing (since doctoral graduation).



Further details of the nomination process can be found on the society webpage at: www.microscopy.org