



Kavli Nanolab Delft
Enabling nanodevice fabrication

Dear cleanroom user,

This is the 30th edition of **Kavli Nanolab News**. In this issue you can find information about:

- Gowning room
- New equipment and investments
- Replacement metal tweezers
- Maintenance week
- FIFO cabinet
- Sliding door wet benches
- NIS News & Tips
- Evaporator usage

Gowning Room

On October 19th the new TNO gowning room will be ready for TNO users, Microsoft users and the cleaning staff. The released hangers will be available for “general use week suits”. These “general use week suits” are available for all users in case the allocated “group week suits” hangers are reserved in NIS. Please fill up the group week suits first, before using the “general week suits”.

Cleanroom suit options:

- *Trainee/pupil suit* (4 weeks on a row, just for people who recently started their cleanroom (wet bench) training, will be arranged during the user intake)
- *Week suits per user group* (one of the group members is responsible for arranging the week suits of the group). Available every week, from Thursdays till (and included) next Wednesday.
- *General week suits (NEW)*. As stated above, these week suits are for general use, when you are running out of “group week suits” or in case your group doesn’t have its own “group week suits”. Available every week and reservation in NIS from Thursdays till the next Wednesday.
- *Few day suits*. Suits, available for all users. Reservations for 1-4 days on a row. No limitations, if a slot is available, you are allowed to book it.
- *Visitor suits*. Can only be reserved by a KN staff member, please contact the Kavli staff.

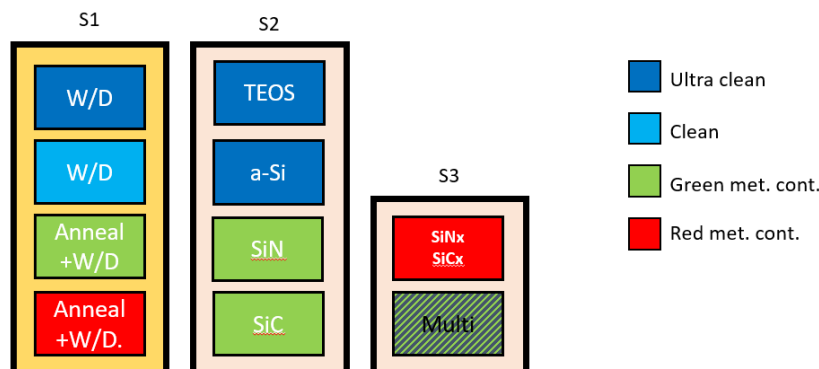
NB: reservation of a suit is strictly personal. Reserve your week suit (general and user group) before Tuesday nights.



Equipment and Investment

EBPG 5200plus has been ordered; delivery end 2023. Location Raman/ laserwriter room.

Furnaces: Three new oven stacks will be located at EKL. The current Tempress furnace at KNLab will be discharged. Delivery of the new oven stacks will be around summer 2023. Suited for 6" wafers, upgradable to 8" in later stage when needed.



Bruker WLI [ContourX-500](#) | [Bruker](#) Ordering phase.

Delivery not certain yet, expected around March/April 2023



Oxford oxide etcher Polaris PlasmaPro 100 with batch loader

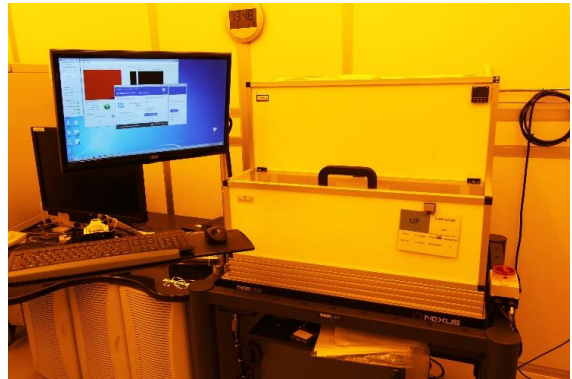
- Electrostatic chuck
- Silicon nitride and silicon oxide etching.
- System will be located at EKL



DMO laserwriter will be discharged as well.

System has been sold to the Haagse Hogeschool (HHS) and will be removed around the end of this year. Currently we are investigating to replace this system by a new one. Tender process will be started soon.

Workgroups are investigating the requirements of different systems like evaporators and sputter systems (e.g. for superconductive materials).



Replacement metal tweezers

To reduce metallic contamination in the cleanroom's process tools we have the intention to replace all the currently used steel-tipped tweezers by ones with a (thermo)plastic/synthetic tip. High levels of stainless steel related metal contamination have been demonstrated in several of our systems and we would like to strongly reduce these contaminants to have a better connection with the EKL contamination regulation and take our contamination control to a higher standard. One of the criteria is how to deal with "ESD safety", which is of great importance to our user committee.

In general the problem of "ESD" means that static electric charge that accumulates on a surface (up to 10kV!), discharges when it is brought in contact with a conductive surface or ground. If this discharge runs through a sensitive electronic device on a chip it could easily destroy it.

Highly conductive metal tweezers are in fact not ESD-safe, because these will just facilitate the discharge. Several other measures are taken to minimize the build-up of static charge, like anti-static cleanroom suits and gloves and static dissipative floors. Furthermore many samples are not ESD sensitive to begin with. People who do have ESD-sensitive samples are usually aware themselves and might take additional measures, like usage of ESD-safe tweezers, a grounded wristband or on-chip ESD protection by design.

In general ESD-safe tweezers are made of a static-dissipative material: conductive, but with a very high resistance, possibly applied as a coating. This material safely dissipates differential charge slowly, because there is no low impedance path to ground that might produce an arc. The tweezers will not prevent static discharge, but they will limit the peak current when it occurs.

At Farnell most of the tweezers labelled 'ESD safe' have a grip with a static-dissipative coating but a metal tip and are therefore not suitable for our work. The other way around, i.e. a metal grip with an ESD-safe tip, is preferable.

The black tipped PEEK (Polyetheretherketone) tweezers that we already (partly) provide are in fact ESD-safe with a high heat capability (260-300 °C), and have a better chemical and heat resistance than most other plastics available.

We will order mainly the tweezers shown below, both for small chips and wafers.



Where needed we will supply ceramic-tipped (zirconia) tweezers which are suitable for even higher temperatures.

(ESD-safe Zirconia Toughened Alumina (ZTA) is also available: unfortunately same black as PEEK...)



We will replace your tweezers free of charge. From a certain moment it will be forbidden to use the current metal tweezers!

Maintenance week

Week 48 (Monday November 28th till Friday December 2nd) we have our maintenance week. Besides standard maintenance work, some actions are planned which could be of interest:

- TNO will replace all card readers. This should make the card reading more accurate and faster.
- We will clean up the excavator cabinets. Unmarked samples (without expiry date and user name) will be removed to free up space. Hence you want to save your samples, please mark them the coming weeks.
- If available, we will use this week to replace ALL metal tweezers by thermoplastic/synthetic/ceramic tweezers, see related topic in this newsletter.
- We will check the safety systems and will test the automatic sliding door in alarm situations.

As usual, you are not allowed to enter the cleanroom during the maintenance week! At Friday, the management of the cleanroom will inform you via NIS when it is allowed to enter the cleanroom again.

FIFO (First In, First Out) cabinet in basement



Kavli Nanolab has, like TNO, its own FIFO cabinet for the storage of CR suits. This cabinet is located right under the TNO FIFO cabinet in the basement. This gives us the possibility to better spread the usage over all suits (instead of using a small amount regularly). Moreover, it gives us overview of the available suits of each size making the life of our logistic people easier.

Access to wet bench area: new sliding door

As you may have seen, the access to the wet bench area has been adapted. Due to the heavy traffic on the corridor, two swinging doors opposite each other could cause dangerous situations.

Please expose your badge at the card reader to get access, even when somebody else already opened the door in front of you.

During the maintenance week we will investigate the safety measures we have taken to open the door in an alarm situation.

We have also got the request to move one of the card readers a little further away from the door, to have easier access to the card reader.



NIS News & Tips

Welcome to the NanoLabNL Information System!

- **Self-examination questionnaires** NIS Courses “Safety” and “Wet Bench Test” have a validity of one year. One month before expiring you receive an email notification to inform you about this. After expiry you lose certain capabilities like reserving equipment that is located in rooms that are linked to the Course. Until now extensions were done on request manually, but from now on it is possible to extend the validity periods of both ‘Safety’ and “Wet Bench Test” by successfully taking a ‘Self-examination’ test via a Questionnaire.

When on your ‘Home’ screen under ‘Nearly expiring courses’ you see [4. Safety](#) or [10. Wet Bench Test](#) (or you can check the validity via Personal – My Courses) you can click on the Course and then + [Apply for course](#). Next you can choose [Open self-examination](#). The rest is self-explanatory.

Apply for course
×

This course offers the possibility to take a self-examination! Do you want to start the self-examination now? Don't worry, we will first show you more details before you actually start with the exam.

[✕ No, I want to register for normal examination instead](#)

✕ Cancel
✓ Open self-examination

If your Course 10. Wet Bench Test (nearly) expired, but the self-examination is not available, likely you also have an expired Course [3. Resist, cleaning, and wet processing](#). This Course is prerequisite and will just be extended on request after you apply for it.

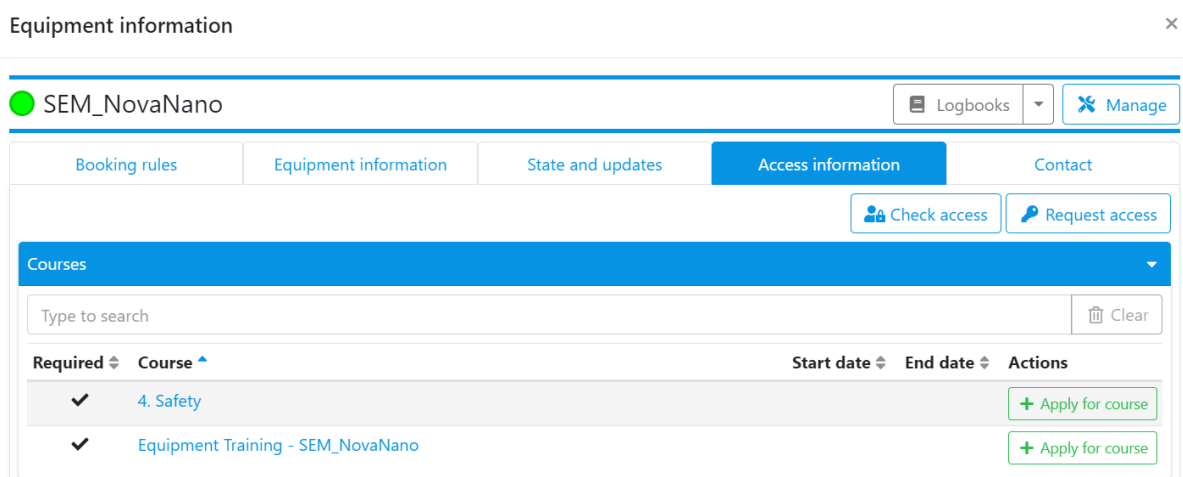
- **Adjusting reservation time slots** Maybe you noticed already: when making a reservation, instead of clicking the arrows to set the time, you can now edit the time field directly. You can also leave out the colon or double zero, so instead of 10:30, you can type 1030, or instead of 12:00 typing just 12 will do.

Start *

End *

Applying for Equipment Training When you want to become an independent user of new equipment please **do not** use the 'Request access' button of the Equipment, but 'Apply for' the corresponding 'Course' instead. When using 'Request access' to equipment your name will not appear in the pending requests list of the Equipment training, so you will not receive an invitation for the intro.

After searching for the tool via Equipment – Search or in the Equipment Planner you can click on the [Equipment name](#). Then its 'Equipment information' window opens, and on the 'Access information' tab you can find the **+ Apply for course** button.



Equipment information

SEM_NovaNano

Logbooks Manage

Booking rules Equipment information State and updates Access information Contact

Check access Request access

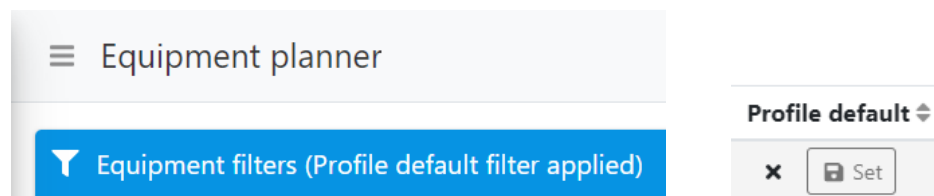
Courses

Type to search Clear

Required	Course	Start date	End date	Actions
✓	4. Safety			+ Apply for course
✓	Equipment Training - SEM_NovaNano			+ Apply for course

A quicker way is to search for the Equipment Training via Institute – Courses on the tab 'Equipment specific courses', click on the [Course name](#) and then **+ Apply for course**.

- Equipment filter preset** It is now possible to set an 'equipment filter preset' as your 'profile default'. Then when you log in on another computer (or after erasing the browsing history) this filter will be re-loaded automatically. First click the blue bar 'Equipment filters', then via 'Edit' adjust your filter settings (and also 'Store' your filter preset). Finally you can set it as 'Profile default' on the 'Filter presets' tab.



Equipment planner

Equipment filters (Profile default filter applied)

Profile default

Set

For questions about this 'NIS News & Tips' or other NIS related issues please contact Marco van der Krogt via [email](#).

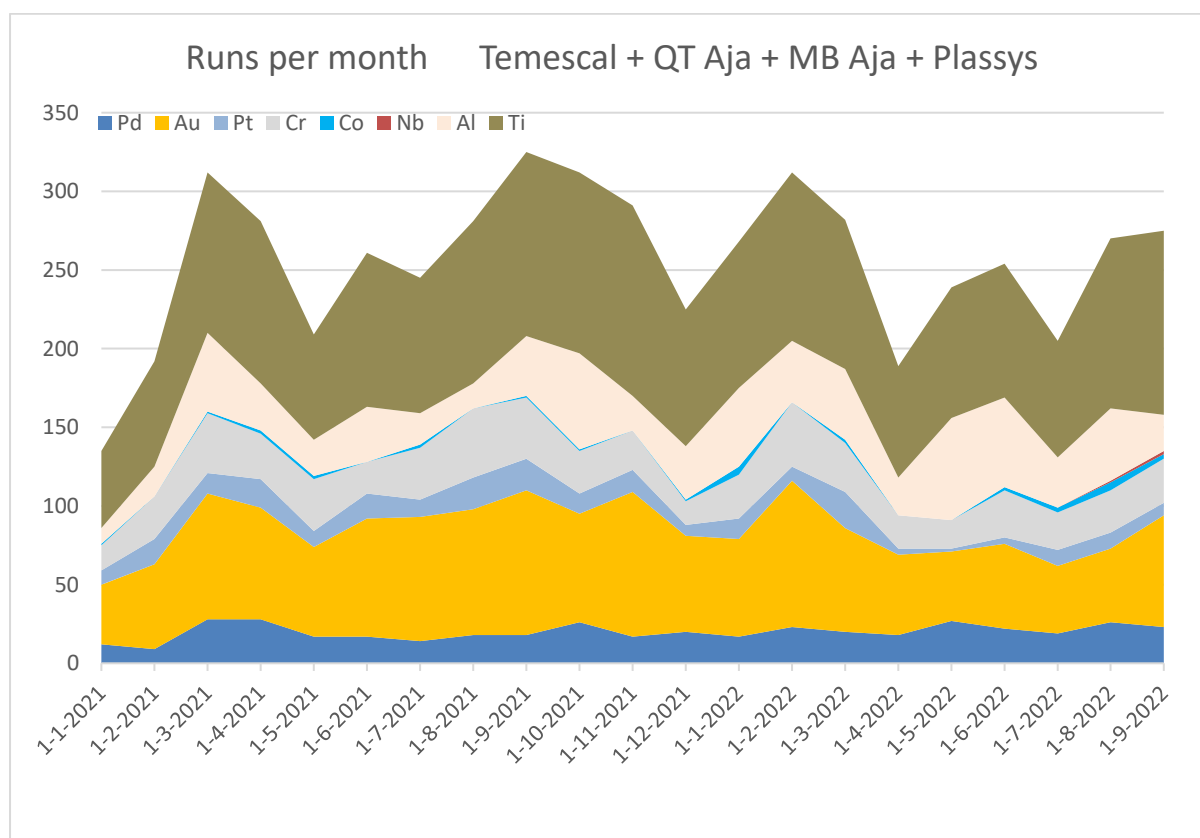
E-beam evaporation at KAVLI

Recently we have been investigating how the various metal evaporation setups are used. The goal is to give insight on how busy the systems currently are, and if there is a clear trend in the demand for certain materials. This can also help in deciding the role for a new evaporation tool. There are ideas about the need for a tool which duplicates current processes, or on the other hand a more experimental tool which offers different materials and new possibilities.

The data about metal usage is from the deposition logbooks and the user load from the NIS reservation system.

There is much more to show, but hereby a pair of graphs.

Firstly the cumulative number of runs on the four “big” evaporators; Temescal, Plassys, AJA MB and AJA QT combined. Shown are number of depositions or “runs” for the metals per month, with divisions for each metal. The application of noble metals seems in steady demand, one could say that recently there is a slight increase in the use of Platinum and Palladium again. Aluminium is mainly used for junctions in Plassys, which are increasingly deposited compared to last year. The more niche Cobalt is unique to QT AJA but clearly again of interest in the recent months. Titanium and Chromium are often just sticking layers or a layer which can be etched, hence the constant high number of depositions of these metals in almost every tool.

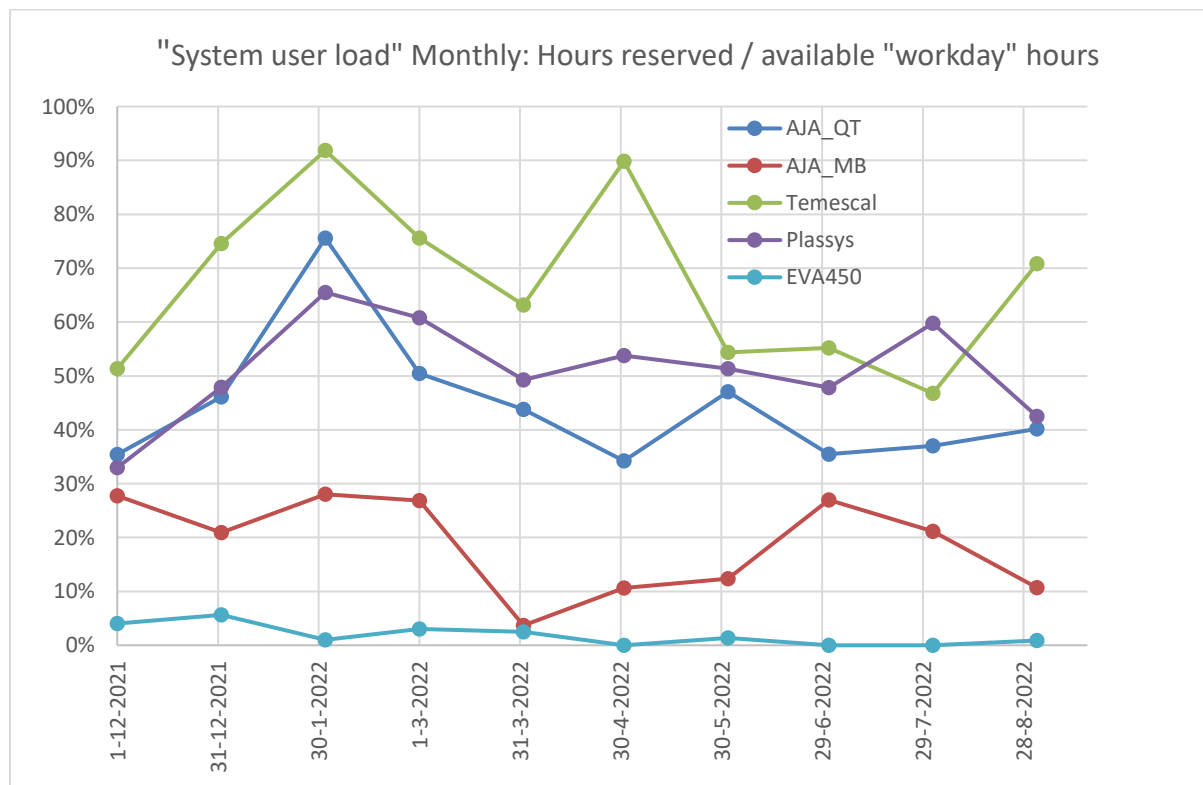


Secondly the data from NIS is converted in the amount of time the system was in a certain state per month. This data is available from 1st Dec 2021. From this we made a guestimate on how high the load on each of

the systems is; when available process time is compared to the time the machines were booked. It is defined as follows;

- Workday : Weekdays 7:00 – 17:00
- Off-day : Evening hours 17:00 – 22:00 and weekend 10:00 - 17:00
- Closed : weekdays 0:00- 7:00 and 22:00- 24:00 , weekend 0:00 - 10:00 and 17:00 -24:00
- “System user load”: The amount of hours that the system has been booked that month is compared to the amount the system could have been booked during working hours that month 7:00 – 17:00 workdays. This means that lost hours due to down or maintenance are already subtracted. 100% thus means that an amount of time equal to the available hours during workdays when the system was “up” were booked – however this still leaves the off hours available (and the guestimate doesn’t take into account if a booking was during off hours.) The idea is that users preferably deposit during workdays – since they might need certain wet bench processing steps etc which cannot be done during off-days.

It immediately becomes clear that especially the Temescal an Plassys are in high demand, the fact that these systems are (partly) automated might explain the popularity of the systems under the users. The recent increase in AJA MB’s use can be understood from to the increase in Pt and Pd we observed before. Eventhough the Plassys and Temescal are well booked, there is still minor room for extra depositions, however we understand that the dependence of certain depositions on other processes will induce that not all available hours can easily be used.



Wet bench window down indication LED

All benches has been equipped with a small LED indicating the window will close soon, see picture. This LED will start to burn 10 seconds before the actual lowering of the window. This should give you enough time to anticipate on this. Raising the window by pushing the knob is not possible while the LED is on.



Farewell Jos Custers

Week 47, we have to say goodbye to our well know contractor Jos Custers from BAM. Many, many years he has been involved in the installation of new equipment, almost all gas tubes in the cleanroom went through his hands and all our waste bins with extraction are designed and constructed by him.

Moreover we know him as a very friendly guy who was always willing to help and was an expert in making word jokes. Even though it hurts, it is time to say goodbye and we hope he will enjoy his well-deserved retirement!

