



Kavli Nanolab Delft
Enabling nanodevice fabrication

Dear cleanroom user,

Close to the end of this year we would like to thank you all for being our cleanroom user. We eagerly look forward to working with you in the coming year, and for many more years after that. We wish you a happy, healthy and an exciting 2023!

The Kavli team

Brian van der Bulk; our new Wet bench process engineer

Hi, my name is Brian van den Bulk, 25 years old, I'll be joining the Kavli team starting 15th of January. I just graduated from Hogeschool Rotterdam in chemistry in which I chose a minor in analytical chemistry. As my graduation research I performed a literature and practical research towards the formation of a catalyser and how you can analyse which formation had formed.

I grew up and lived my entire life in Bergschenhoek. In my free time I volunteer as a scout's leader for children from the age of 7 – 11. We are mainly focused on water activities like sailing, canoeing or building rafts. But we also do other activities like hiking, mountain biking, climbing and sometimes we make things like catapults. With that experience in mind, I went backpacking with some friends through the UK which was amazing. If I still have time left I like to game, watch series or spent time outside.

Now that you know a little more about me I'm looking forward to meet and work with you all!



Retirement Jos Custers

Jos Custers from Company BAM spend more than 30 years at DIMES, EKL and Kavli. Almost all gas tubes in the Kavli cleanroom have been fitted and installed by him. We celebrated his retirement with the Kavli staff members and some of his BAM colleagues in November. As a farewell present we gave him handmade, leak checked, stainless steel suit hangers, made by Ron van Viersen and Marco Bakker.

Outside working hours regime

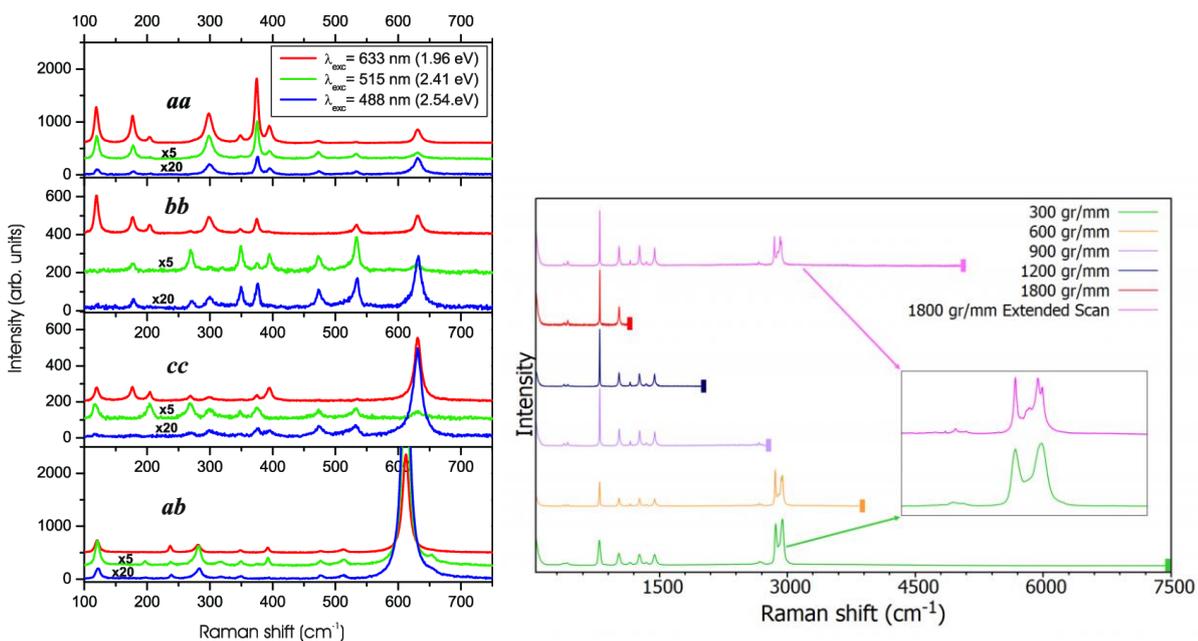
Due to limited availability of cleanroom staff between December 26th and December 30th, the cleanroom will be in "outside working hours regime" during that period. High risk work is not allowed and medium risk need to be carried out with a buddy.

Equipment and Investment

Upgrade Raman Microscope

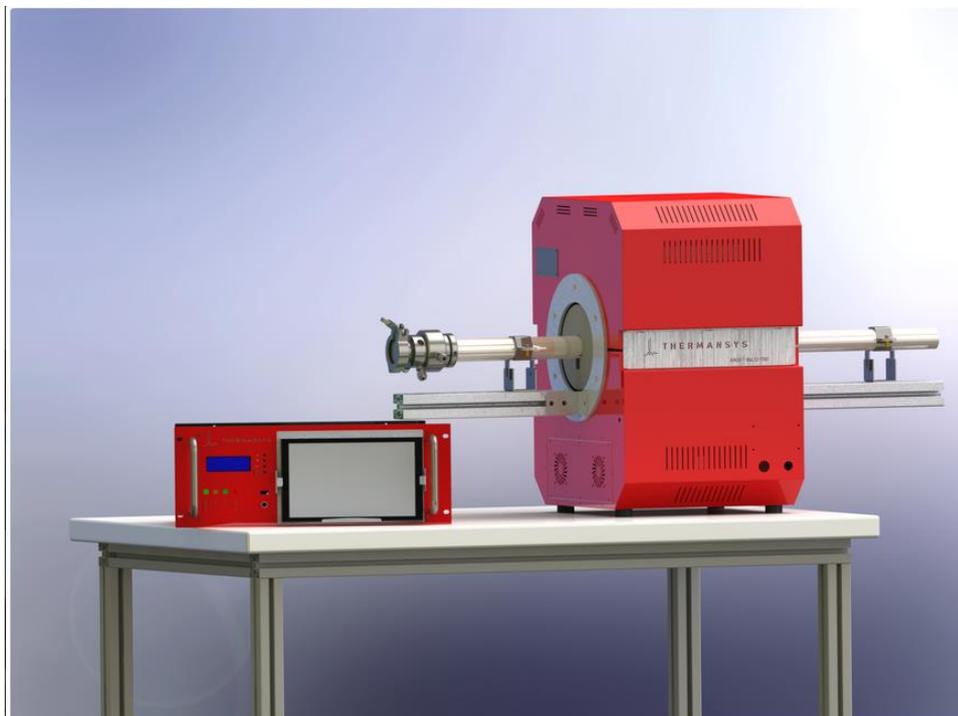
After many requests (nearly all users of the system) we are currently upgrading the Raman system with a 488 nm laser (and accompanying filter) plus a sharper grating (3000 grooves/mm). Our current grating is 1800 grooves/mm, keep in mind it still has the advantage of being able to capture a larger range without stitching. The 488 nm is in particular useful for WS₂, which is used by quite a few groups.

Below some random examples of the effect of different excitation wavelengths on peaks appearing (or not/barely) and the effect of a sharper grating. It should be noted that this also has an effect on the photoluminescence, which can also be useful.



High temperature tube oven.

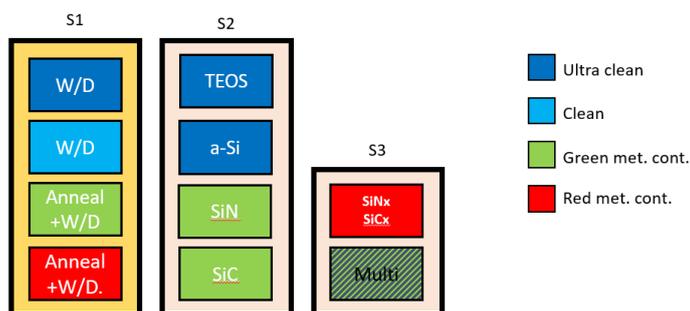
A new tube oven is being procured, this diamond oven will be able to reach temperatures up to 1800C (and possibly higher), have both atmospheric capability and deep vacuum ($\sim 10^{-8}$ mBar), and has 3 MFC's with hydrogen, nitrogen and argon. The oven will be used solely for diamond.



Other investments (follow up):

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

Furnaces: Order has been placed, delivery around the summer.



Bruker WLI [ContourX-500](#) | [Bruker](#) Ordered, will be delivered end of February 2023



Oxford oxide etcher Polaris PlasmaPro 100 with batch loader

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

System has been ordered, will be delivered around May 2023



Workgroups are investigating the requirements of different systems like evaporators, sputter systems (e.g. for superconductive materials) and Laserwriter. New workgroups will start in Q1, 2023 for instance to invest in a new stealth laserdicer.

Replacement metal tweezers (follow up)

To reduce metallic contamination in the cleanroom's process tools we will replace all metal tweezers by ones with (thermo)plastic/synthetic tip. Also the carbon fiber tip tweezers will be replaced, since these are not resistant against elevated temperatures and are hard to distinguish from the new tweezers. During week 52 we will remove all metal tweezers from all user boxes as communicated in our last newsletter and by NIS email. The new tweezers are resistant to temperatures of 260°C and even short exposure to 300°C and are ESD compatible.



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. Starting from January 1st, *it will be forbidden* to use the current metal tweezers for sample handling!

Replacement Gas cabinets

Our old gas cabinets in the gas storage were not meeting our standards anymore. The fire resistance of these old cabinets was just 30 minutes, while 90 minutes is the standard nowadays.

After the Silane incident last year we also implemented some additional safety features in the gas reduction panel of this explosive gas. These safety features has been also build in on our new gas panels. Also, the full gas lines from the cabinets up to the cleanroom VMB have been replaced.

We are quite happy with this major improvement!



New card readers

Last maintenance week, all card readers inside the cleanroom have been replaced. Some of them are not working yet, TNO expect to get these card readers operational around end of January.

Replacement of FFU units

The current filter Fan Units (FFU's) are EOL. Company Kuijpers is going to replace all FFU units of the cleanroom in 2023. In January we will have the kick-off meeting with involved parties for the planning of this huge project. Around May they will start with the actual replacement and this will take a few months. During this period, all modules will be closed sequentially for a few days during the actual replacement. We will keep you informed about the impact on the use of the cleanroom equipment.

Safety questionnaire, statistics

To extend your safety course we have implemented the questionnaire in NIS recently. Quite some users got the message to do the mandatory safety questionnaire. Nis gives us the option to view how many of the users answered the question correctly, partly correct or fully wrong. It could also be that the question is not clearly stated. By using these statistics we are able to improve our training and questionnaire.

