

The logo features a large, stylized 'KN' in white inside a purple hexagon, followed by the word 'NEWS' in a large, grey, sans-serif font.

Dear cleanroom user,

This is the 23<sup>th</sup> edition of **Kavli Nanolab News** and our first newsletter of 2020. We are living in weird times, with this threat of the COVID-19 virus. As you know, we took precautionary measures to reduce the risk of COVID-19 spreading, which have, of course, an impact on working practices in our VLL cleanroom. At this moment we are one of the few cleanroom labs in the Netherlands, which are still open for a limited and dedicated amount of people. With the measures we have taken, we think it is still safe to work in the lab. It is really important to apply to the rules, please follow them as good as you can! We don't have the possibility to train new users nor to give introductions to new equipment.

With the departure of Frank Dirne and the appointment of Marc Zuiddam as Operations Manager, we have a vacancy for a process engineer: <https://www.academictransfer.com/en/290929/procestecnoloog-dunne-film>

Feel free to share this link!

In the coming period we will try to give you the high level of cleanroom assistance as usual. Be aware though that repair of equipment and process assistance can take a bit longer due to the limited available staff at the campus.

Stay well and healthy!

The KN staff.

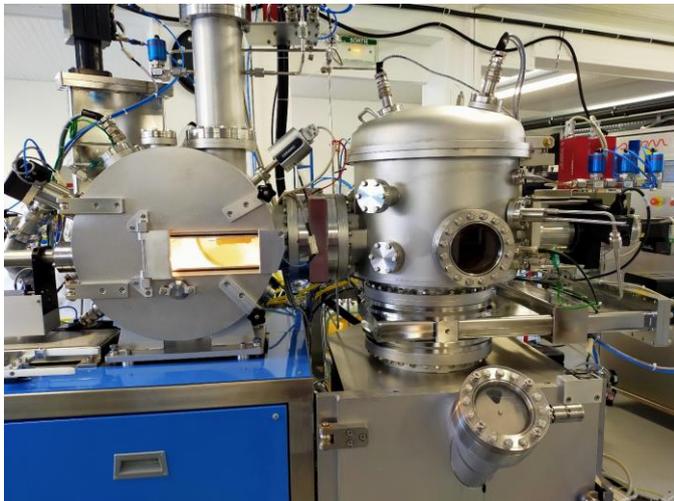


## INVESTMENTS

### New ultra-high vacuum evaporation system Plassys

Recently Kavli Nanolab has installed a new ultra-high vacuum e-beam evaporation system from PLASSYS, type number MEB550S2-III, in cleanroom P.00.330 (TU-14). With this machine aluminum junctions can be deposited in a fully automated sequence. The sample stage can be tilted very accurately and can also be rotated during evaporation. An oxide inlet is implemented on both the loadlock and the oxidation chamber for dynamic or static oxidation of deposited films. The system is equipped with liquid nitrogen sample stage cooling and the sample can also be heated by IR and UV lamps. The machine also includes a Kaufman ion source for argon milling in the loadlock and an RGA (SRS 100 amu) on the oxidation chamber. Source to sample distance is 635mm. The evaporation chamber with the e-gun and evaporation sources can be sealed from the sample oxidation and vented separately for target refill and maintenance. Currently the machine is loaded with titanium, tantalum and two crucibles with aluminium: 5N and 6N. 4 inch wafers and smaller sized samples can be mounted on the substrate holders.

*Ask Marco van der Krogt for an introduction.*



### ALD Anric

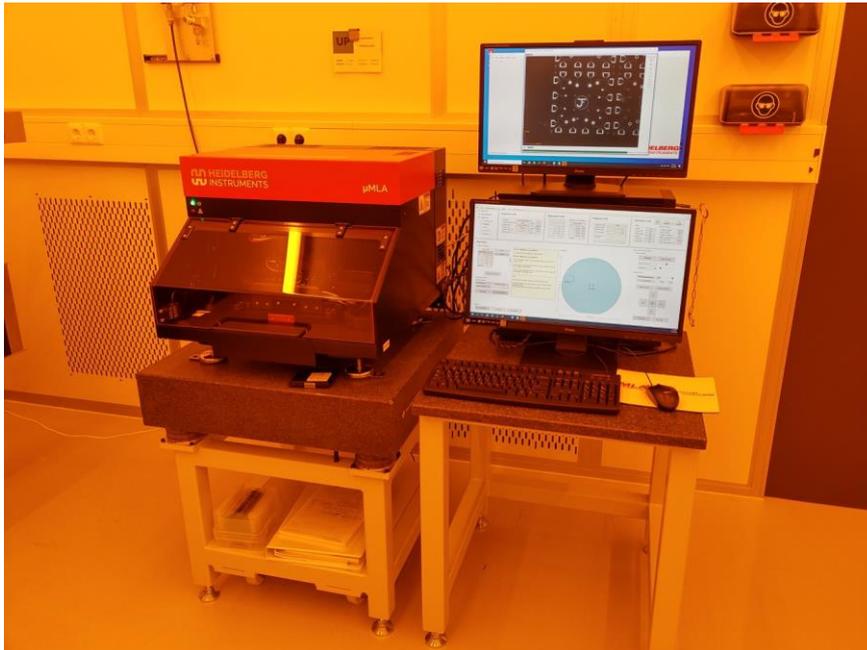
This upcoming period we are about to install the ALD Anric which is an Atomic Layer Deposition system only used at room temperature. The ALD Anric is a small table top ALD where you can process a 4" wafer and small pieces of wafers. TMA together with H<sub>2</sub>O/O<sub>3</sub> will be used for deposition.



## New UV laser direct write system

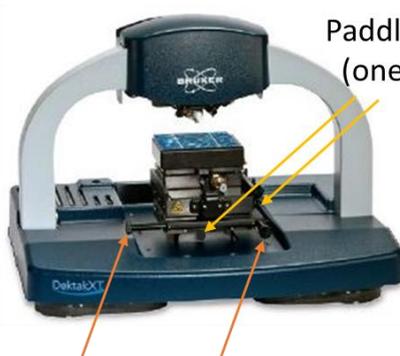
A new laser writing system, the  $\mu$ MLA from Heidelberg, is installed in the measuring room opposite the 'old' laser writer. The system is equipped with a raster scan exposure module and uses a DMD spatial light modulator enabling a writing speed up to  $30\text{mm}^2/\text{min}$ , much faster than the old system. The minimum achievable feature size is  $1\mu\text{m}$  and for overlay alignment between two layers  $3\sigma$  is better than  $1\mu\text{m}$ . The  $365\text{nm}$  UV LED is exposing broadband and i-line resists.

*For more information please ask Anja van Langen*



## New profiler, Bruker DektakXT Basic

A second profiler is installed in the cleanroom area, close to the dicer. This profiler looks, feels and operates basically the same as the Bruker DektakXT. The only difference being, that the old profiler stage is motorized and the new profiler stage is manually controlled, with paddles for course translation and a knob for fine tuning. This difference results in an empty space, in the software of the new profiler. Where normally the stage controller buttons would be, as we know them from the old profiler. This new profiler is placed on a C-frame table, which introduces a little bit more noise than the old motorized profiler.



Paddles for course translation  
 (one invisible in this image)  
 Press and move

Knobs for fine translation

## New HR SEM

A new high-resolution SEM, the Regulus 8230 FE –SEM from Hitachi, is installed in the same room as the other Hitachi SEM. The Regulus 8230 has 0.7nm resolution and a big advantage of the tool is its capability of easily imaging poorly conductive substrates. Unfortunately the user interface differs from the S4800 FE- SEM.

Acceptance and staff training on the tool are waiting for the end of the corona measures.

*For more information please ask Hozan Miro.*



## Re-arrangement of wet benches

Our cleanroom users asked the KN staff to reorganize the functionalities of some wet benches. As an example, some users asked us if we could make high risk chemicals available in TU08. We discussed the wishes and possibilities with a selection of users and we decided to implement the following changes:

- The spinner in TU01-01 can be used for conductive polymers (e.g. electra). Main functionality of TU01 will not change and is dedicated for spin coating of e-beam resists.
- TU02 will be a complete organic processing module. Inorganic developing goes to TU07.
- TU03 is still for inorganic processing. We will move the processes with HF or HF containing products to TU08. Also the HF vapour etcher and tri-acid cleaning will move to TU08. So TU03 can be better used for e.g. RCA1 & 2 cleaning.
- Spin coating of photo resists will stay in TU07. The bench TU07-01 (now KOH and electroplating) will be used for inorganic development (e.g. MF321).
- TU08 will become a complete inorganic module for special processes like electroplating, tri-acid cleaning, HF processing (2 benches) and KOH etching.
- The spinner in TU10-02 can be used for photo resists. By doing this, we create a back-up solution in the case bench TU07-02 is down. Bench TU10-01 will be the backup for inorganic processing, like developing.

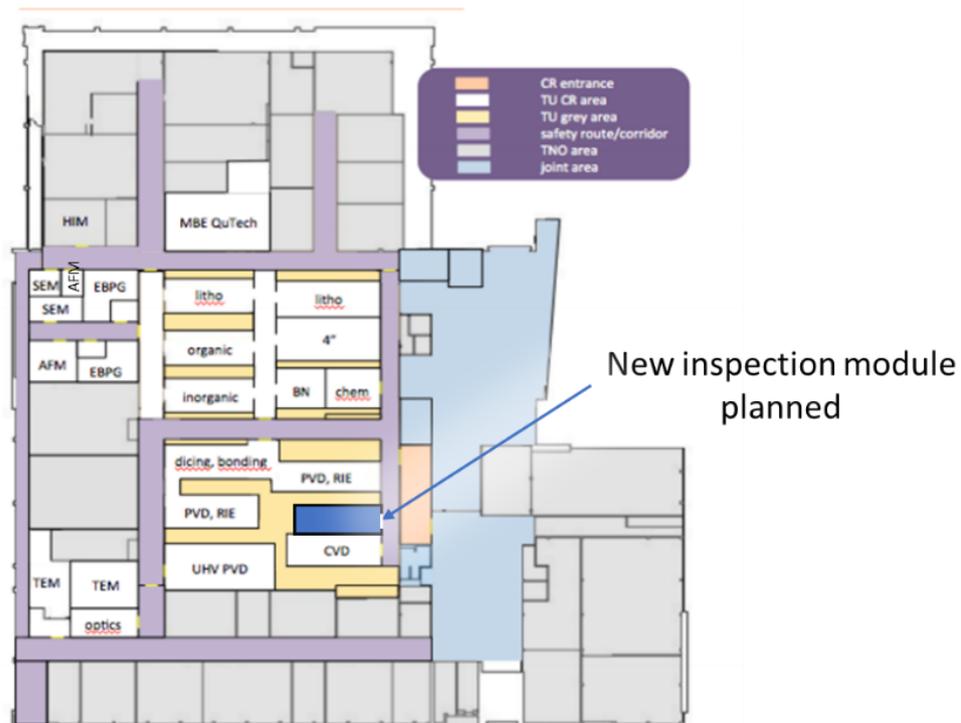
We will also move and reorganize some of our chemical cabinets. In TU07 we will place an extra Olympus microscope. After consulting the re-arrangement with the users, we agreed that some other processes can

be done in the dedicated benches, in consultation with the KN staff. We will inform you when these changes will become effective.

For more information please contact Eugene Straver or Pauline Stevic.

### New module for inspection techniques

A former grey-area in the cleanroom, will be partly converted, to a new measurement area, especially for inspection techniques, such as particle counter, profiler(s), microscopes and the ellipsometer.



## AFM introductions

Due to the COVID-19 virus closing of the cleanroom, all introductions have been cancelled until further notice. Including AFM introductions. In order to maximize throughput, as soon as this situation changes, I would like to ask all students, who are interested in receiving AFM introduction, to watch online videos.

This will reduce time spent on the introduction itself, from 2 hours to about 30 minutes.

Please send an email if you are interested to [l.n.schriek@tudelft.nl](mailto:l.n.schriek@tudelft.nl) and she will send you the instructions.



## New: Equipment introduction via videos

To reduce the time we spend on giving introductions we are recording equipment introductions on video. We hope this will be helpful for our users as it reduces time and the videos can be viewed multiple times. We just started this project and will implement this in the near future. Be aware, It will not replace the standard equipment introduction. The first video will be available in the week of 6 April, please check our website.