

Dear cleanroom user,

We are pleased to present the second combined newsletter of Else Kooij Laboratory and Kavli Nanolab. In this newsletter, we will keep you informed about all activities within the shared TU Delft cleanroom infrastructure, including updates on new equipment, procedures, introductions to new colleagues, and other exciting developments.

We hope you enjoy reading it!

On behalf of the EKL and Kavli Team,

Pieter Telleman, Bruno Morana, and Marc Zuiddam

New course program for the TU Delft cleanroom:

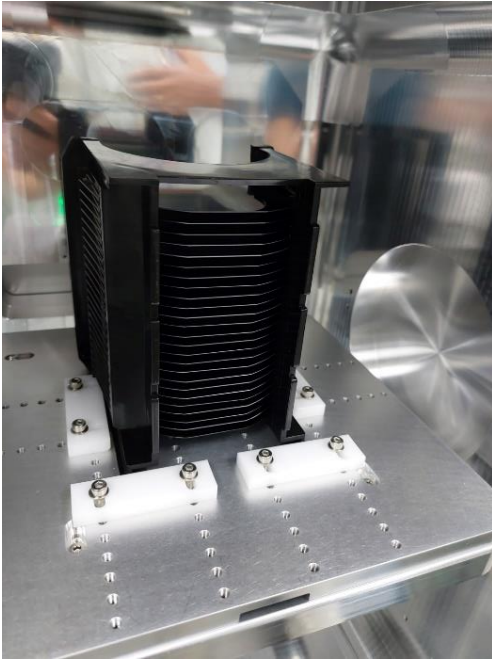
TU Delft has an extensive cleanroom infrastructure located at two sites on campus: Kavli NanoLab at the Faculty of Applied Sciences and Else Kooij laboratory at EEMCS. Each part of this infrastructure has its own strong points, and we welcome and encourage users of the cleanroom to explore the capabilities of each of these facilities at the TU Delft. Efforts are ongoing to bring activities in both cleanrooms closer together and ultimately move to a new location on the campus as a single organization. In the meanwhile, we are in the process to identify where we can achieve the largest synergy. One of the first projects we have engaged in is providing a single new course program that will allow new cleanroom users to safely use either part of the TU Delft cleanroom and take full advantage of its capabilities. We bring together best practice and experiences from the existing course programs and align efforts in as much as possible. More details will be provided as soon as we have a clear overview of the different parts of this new course program.

Status on the new Oxford oxide Etcher

Back in August 2023 the new Oxford Plasma Polaris was delivered to EKL to be installed. This is a new Inductively Coupled Plasma (ICP) oxide etcher that will be utilised to (at this moment) etch SiO_x, SiN_x, and a-Si structures.

This system has a cassette chamber and an ESC chuck compatible with 4-inch wafers that in the future may be upgraded for compatibility with 6-inch wafers.





Factory acceptance has been successfully completed in December and currently process acceptance is still underway. During the process acceptance phase the standard recipes to be used for etching processes are being adjusted to ensure that certain process parameters for this system are met. The parameters that has been measured until now with the current recipes are as follows:

Material	Selectivity (To Resist)	Etch Rate (nm/min)
SiNx	2.7	370
Si	4.6	230
SiOx	2	400

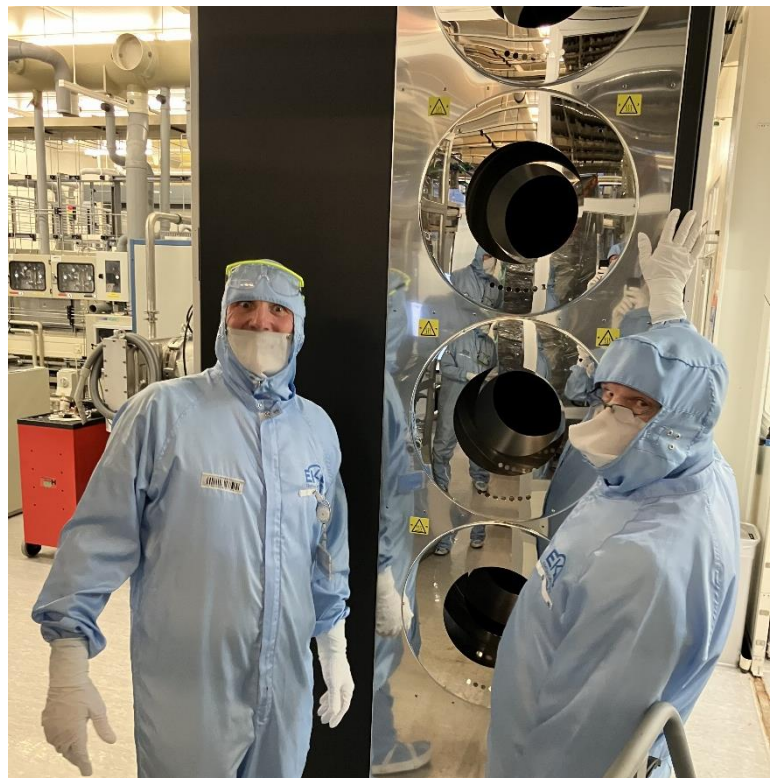
With further optimization these parameters will change.

The Polaris is set to be finished with commissioning in February and the official trainings to start in March. The Polaris is located in room 36.05.00.210 (When you enter the cleanroom, the 2nd tunnel next to the tunnel leading to the Litho room).

Arrival of new Tempress furnace stack

Back in December of 2023, the first new furnace stack from Tempress was delivered and installed in the Class 100 cleanroom (@EKL). This is the first of three stacks that will replace the old Tempress furnace stacks A through F. These older furnace stacks date back to 1989 and were installed around the time the cleanroom was originally built. You could say that the cleanroom was built “around them”, so the upgrade is significant in more than just the size of the stacks themselves.

The new Tempress furnace stacks feature heating elements suitable for 200 mm wafers, with quartz tubs that can accommodate up to 150 mm wafers, and feature wafer sleds for 100 mm wafers. So while the systems will initially be set up for 100 mm wafers, there is the option to reconfigure one or more tubes to 150 mm or 200 mm wafers in the future.

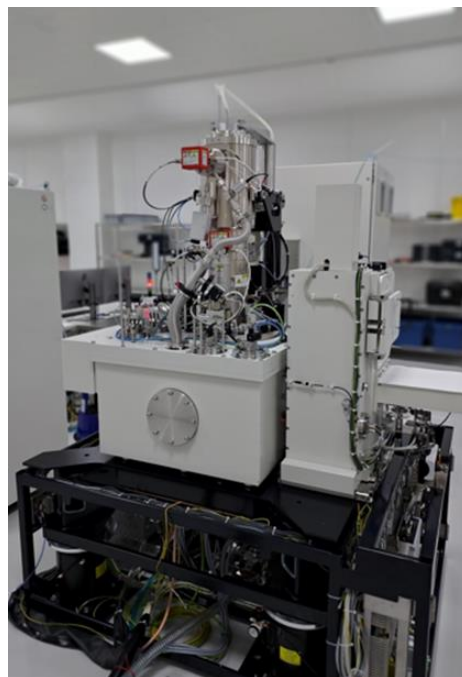


The phased removal of the old furnace stacks and installation of new stacks is being planned to continue in Q1 and Q2 of 2024.



Oncoming EBP5200Plus installation

After removal of the equipment, the room behind EBP5000Plus is being prepared for installation of our new EBP5200Plus system, which currently is being assembled at Raith in Best:



For now, we expect the installation to start in April 2024, after which the system might come available in May. Later on, good old EBP5000Plus will be removed.

As compared to the EBP5200, the reworked new system has less and smaller ion getter pumps, a different high tension unit, no Z-stage, and should be more stable and show smaller field and stitching errors. Holders are exchangeable (and we ordered several too), and we'll only have a Confovis pre-alignment microscope for it. Software environment and pattern data files are the same.

The departure of Roald van der Kolk as Kavli staff member



I am excited to share that I am embarking on a new journey as I leave Kavli to pursue a Ph.D. in applied science, Impphys and in collaboration with QN with Iman Esmael Zadeh and Mazhar Ali.

This would not have been possible without you! I have learned so much simply by being around you guys here. Reflecting on my time at Kavli, I am immensely grateful for the enriching experiences and the valuable knowledge I have gained. Each day spent here has been a learning journey, and I am deeply thankful for the friendly and intellectual environment that has nurtured my development over the many years I have been a part of this community.

I extend my heartfelt appreciation to all of you, at and around Kavli, for contributing to my educational, ethical and professional journey. Without your support, questions and conversations this transition to a Ph.D. would not have been possible.

Introduction Esther Pot:

I am Esther and currently studying applied physics at The Hague University of Applied Sciences in Delft. My graduation internship is focused on improving the electroplating setup and recipes, with Eugene as my supervisor. I am originally from Leeuwarden in Friesland, but I moved to Delft after high school. In my studio, I share space with two special roommates: Luna, a Hognose snake, and Helios, a Ball Python. Besides my snakes, I am busy setting up a saltwater aquarium as a hobby.

I'm a member of the Delftsche Studenten Bond (DSB), actively involved in a dispute, called C.H.T. Krat!, where we regularly go on weekend to Dutch villages in the middle of nowhere, immersing ourselves in culture and drinking beer. Every year, we go on holiday to a local village in Belgium or Germany, contributing to their economy by purchasing almost all their beer for the week. The entire week is always filled with various and crazy activities to make some unforgettable moments.

You can often find me at the swimming pool twice a week, engaging in early morning training for competitive swimming. Aside from swimming, I have a passion for cooking, gaming, playing board games, visiting museums, and traveling.

I am looking forward to meet and work with you all!



Introduction Maarten Houten:

My name is Maarten and since the 5th of February I started as an intern at Kavli with Bas as my supervisor. This will be my thesis project for The Hague University of Applied Sciences. My bachelor is in Engineering Physics and at Kavli I will focus on a project about replacing an inductor by a granular aluminum (grAl) nanowire for the Fluxonium qubit. This grAl nanowire acts as a linear inductor and consists of a layer of Aluminium Oxide with small islands (~4 nm in diameter) of Aluminum on top of it. Before starting this internship, I have already been working on this project with a fellow student (Joshua) since late September. During this project, we tried to create a PVD recipe for the Plassys that evaporates aluminum in an oxide environment which effectively deposits grAl. In the last week we managed to create a recipe that gave similar results for 10 different depositions. In the coming weeks, I will focus on fabricating the nanowires to test the PVD recipe and hopefully one day implement them in a Fluxonium circuit. I am already enjoying my time here and looking forward to the coming weeks!



Introduction Sander Le Kluse:

I am a fourth-year applied physics student at The Hague University of Applied Sciences (THUAS). Until the end of May I will be working at the Kavli Nanolab on my graduation internship. I will focus on increasing the knowledge of deep dry etching, more specifically I will be characterizing the optimal settings for various etching patterns.

Prior to THUAS, I completed the Leidse instrumentmakers School where I learned to design, produce and assemble instruments, such as mirror holders for optics.



I come from a large family with two brothers and two sisters (two twins). In my spare time I like to play games (card, board, games, etc.), read books or watch series. I am very excited to be part of the Kavli Nanolab team and to learn from their expertise and experience. I am grateful for this opportunity and I hope to contribute to their research and innovation.