DTU DANCHIP

DTU Cen

TECHFORUM September 2017

Facts and figures

Agenda

- News and update
- TPT
- Additions to the pricing model
- New equipment
- Facility stuff
- Equipment going on retirement

Increase throughput ---- increase efficiency

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Things keep changing over the last years (equipment, resists, safety)

There are plenty of new technologies available (ALD, DUV, etc)

Get a Danchip co-supervisor

Get your processes flows checked and updated

USE Tool Package Training where available

It is much more efficient **for all** to update the process flow and plan training according to an updated flow instead asking for single tool training.

Prepare to process during fringe hours.

DUV stepper II

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In the process of looking for funding

Increasingly difficult to get money for equipment

Anticipated cost: ~35 mio DKK

Time line: secure funding during 2018, installed tool medio 2019

Anticipated specs: CD 150nm – 200nm, 150mm wafers, 200mm wafers

If you have a case or project where a new stepper would make a difference please tell us !

Safety light

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Safety light = first part of standard safety course

Same safety course part one for all users, students, guests etc.

TPT Tool Package Training

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The way to get trained at Danchip

no more individual training on

tools that are included in tool packages

Tool package training (TPT) - Status

Safety/Introduction course

Revised safety course, E-learning (video + PP with speak)
online test on safety in cleanroom pass/fail
this part is mandatory for all users, including guests, 3 week students, summer school students

Practical part: small groups (4 participants)
this part is mandatory for all regular cleanroom users

Lithography
3h theoretical (Video+oral)
Practical training session: 3.5 h (4 participants)

SEM training
3h theory, 2h practical training at SEM in basement 346

Mask design
Tutorial based – independent of cad program, launch October 1st

Dry etch training
3h theory, 2h practical training

February 2018: **Thin film** TPT

Present structure: External funded projects and users (UK95, other universities: UK10 , companies in funded projects)

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+ overhead

Service from Danchip	Cost	
Cleanroom access (below cap)[a)]	550	kr/h
Danchip assistance	550	kr/h
Cleanroom area	(500)	kr/m²/mo
Category A tools	170	kr/h
Category B tools	400	kr/h
Category C tools	2100	kr/h
Category D tools	550	kr/h
Category E tools	1300	kr/h
Category F tools[b)]	0	kr/h

a) Cleanroom access above cap of 20 hours is 0 kr/h

Future structure: External funded projects and users (UK95, other universities: UK10, companies in funded projects)

Service from Danchip	Cost (DTU budget)	Cost (Other holds budget)	Unit
Cleanroom access (below cap)[a)]	550	550 +44%	kr/h
Danchip assistance	550	550 +44%	kr/h
Cleanroom area	(500)	(500) +44%	kr/m²/mo
Category A tools	170	170 +44%	kr/h
Category B tools	400	400 +44%	kr/h
Category C tools	2100	2100 +44%	kr/h
Category D tools	550	550 +44%	kr/h
Category E tools	1300	1300 +44%	kr/h
Category F tools[b)]	0	0	kr/h

+ overhead

a) Cleanroom access above cap of 20 hours is 0 kr/h

Increase transparency of Danchip usage

- Statement to supervisors
- Quarterly (initially)
- Information about:
  - Projects
  - People on these projects
  - Activities

NEW EQUIPMENT

In the pipeline

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- **Renewal** of our old (15-25 years) **Plasma etching tools**

  - Conventional RIE (2 tools) – various materials

  - AOE (STS) for etching dielectrics (oxides/nitrides)

  - Deep Si-etch of 6”+ substrates

- **Renewal** of our old (10-25 years) **PVD tools** - looking for:

  - New workhorse on E-beam evaporation

  - PVD multi-chamber tool: Dielectric sputter / DC sputter / E-beam evaporation / central dealer

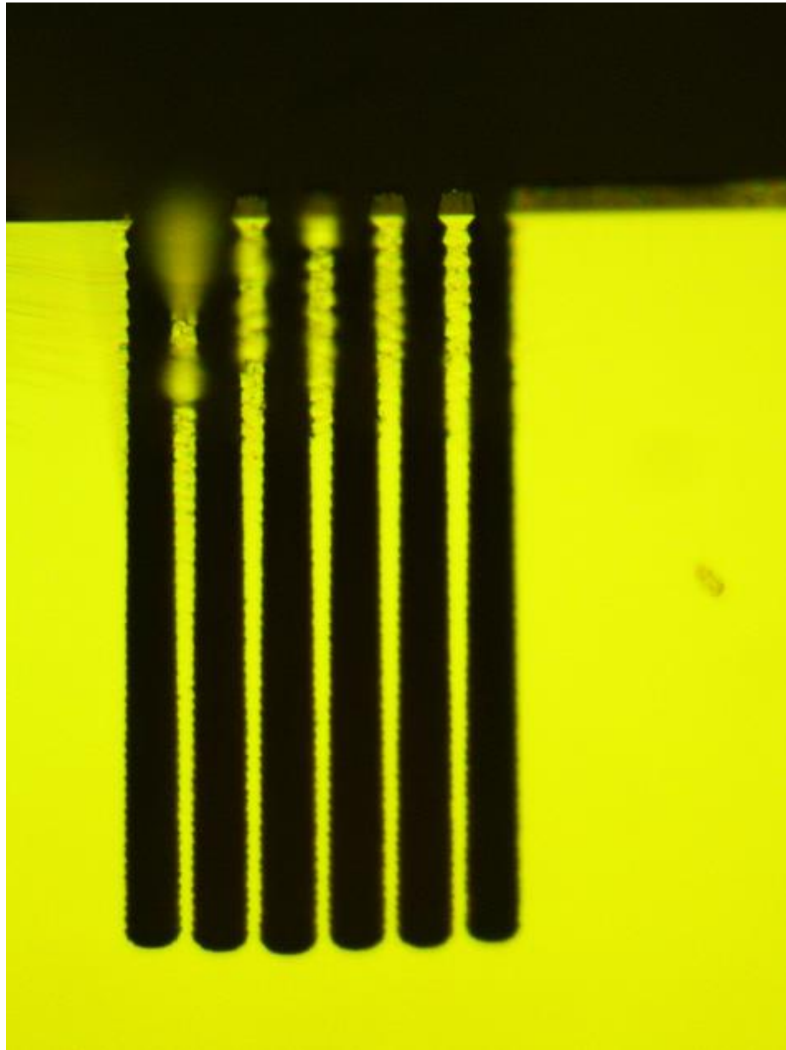
Pegasus 2: DRIE of silicon (Research & development)

- Background:
  - Bottleneck situation on Pegasus 1
  - Backup system & research
- 6" set-up (TDESC)
- Installation finished – first tests yesterday

+

ASE reconfigured: CF_4, CHF_3, H_2, He + MFCs added

Pegasus 2: First tests



Logistics: Moving in Twin-Pegasus – Moving out Cluster 2 (RIE-2)

Decommisioning of RIE-2 (latest end of 2017)

Reconfigure ASE (CF_4, CHF_3, H_2, He + MFCs)
Establish Pegasus 2
Transfer RIE-2 processes to ASE (RIE-mode)
Transfer ASE processes to Pegasus

New acqusition: Twin-Pegasus (version 2010)

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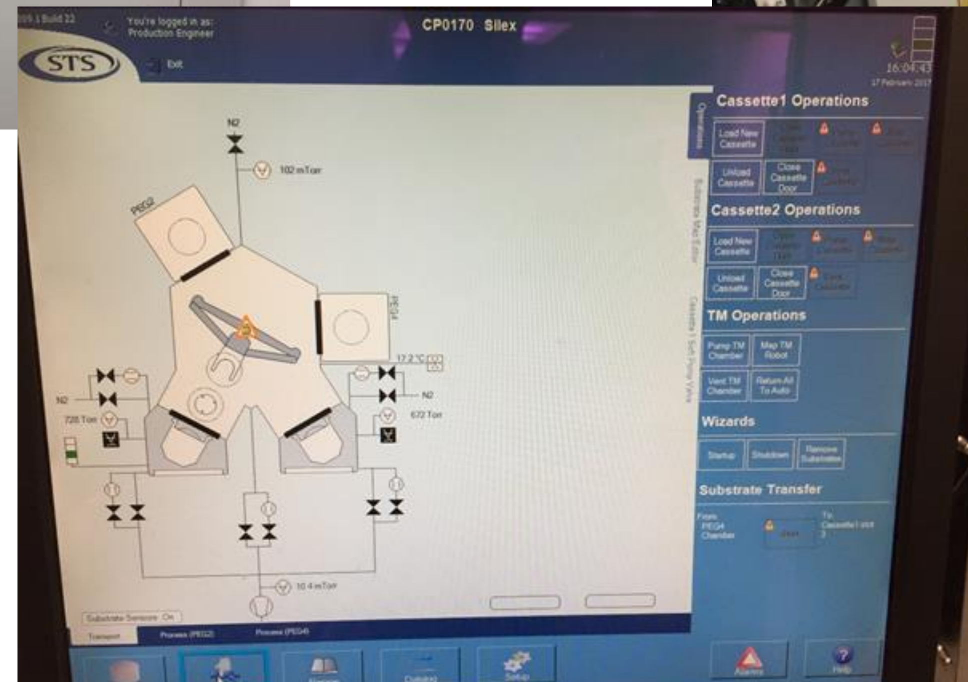

Twin-Pegasus: The Plan

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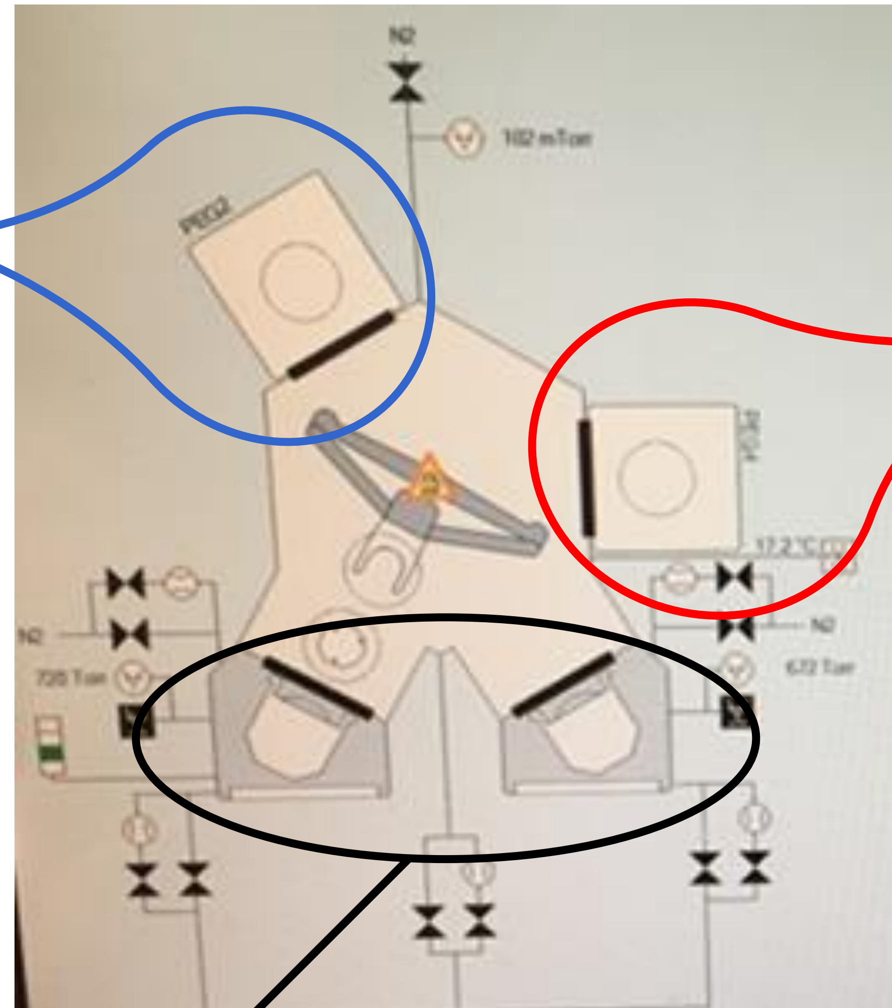
Pegasus 3

DRIE (Si) – 6”

High-throughput

Cassette-Cassette

”Workhorse”



Pegasus 4

DRIE (Dielectrics) – 6”

Reconfigure (Dielectrics)

High-throughput

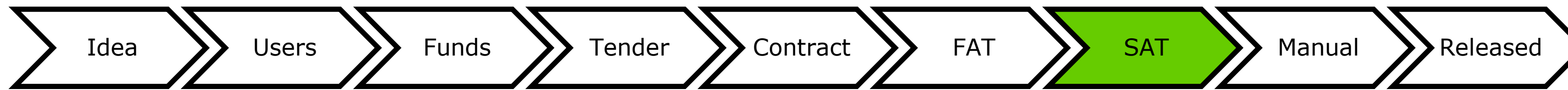
Cassette-Cassette

”Workhorse”

CPX Platform

twin vacuum cassette cluster

(Brooks handler)



Diamond thin film: Seki SDS 5250S

Key features

- Microwave Plasma CVD (2nd hand system)
- Generator: 5 kW @ 2.45 GHz
- Substrate: 4” max (2” standard)
- Gases: N_2 , H_2 , CH_4 , O_2
- Installation: On-going, aim for tests in October

Growth process

- H2:CH4:O2 (478:20:2 sccm) @ 600-1000 C
- Power 1.5 – 5 kW (typical)

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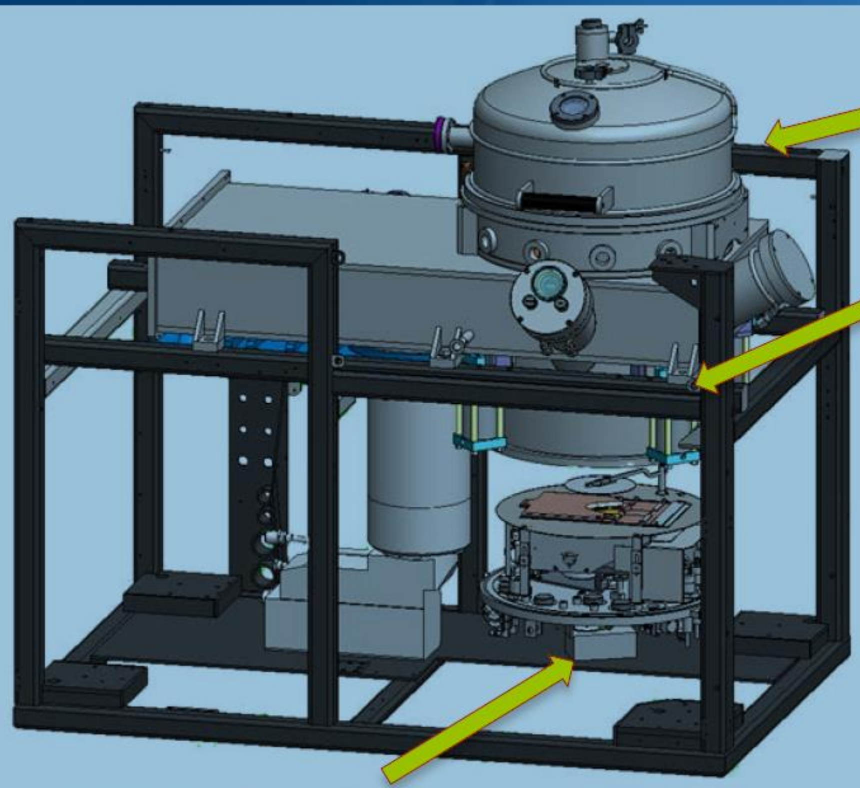
Direct award/Tender preparation: X-Ray Diffractometer

- Background:
  - Complementary in-line material analysis (crystalline/ poly/nano-crystalline)
  - Co-funding (Danchip/Fotonik)

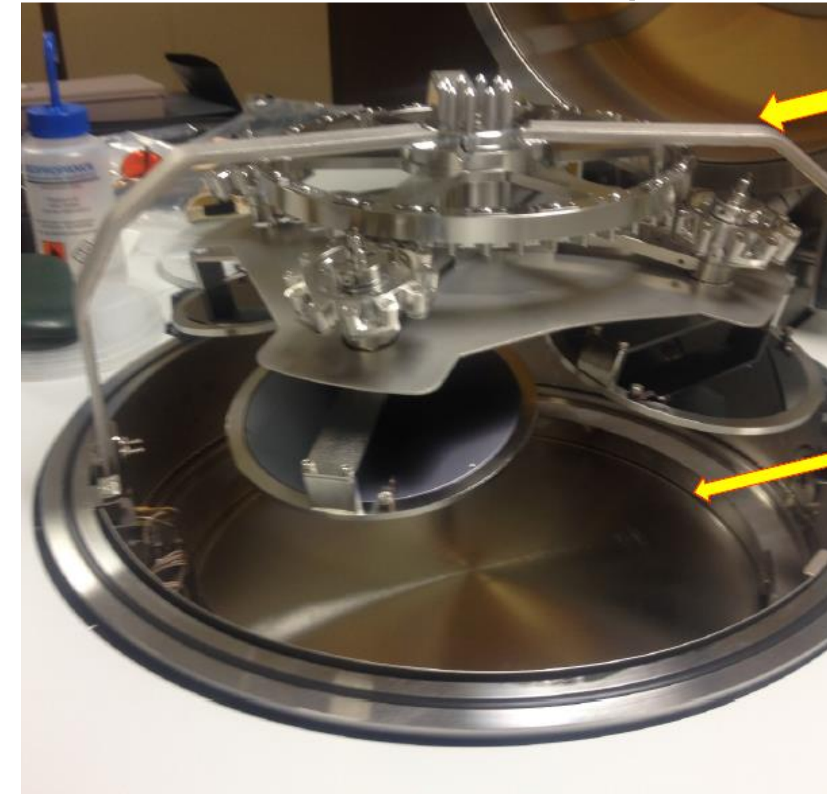
- Material properties:
  - crystal orientation
  - grain size
  - electron density
  - film thickness

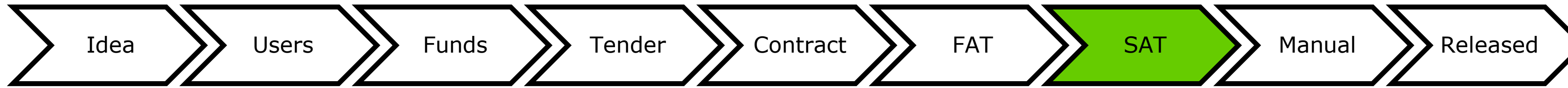
Workhorse on E-Beam Evaporation

Direct award: FC2000 from FerroTec-Temescal



- High throughput (15 min)
- High flexibility (special holders)
- High uniformity (HULA substrate holder)





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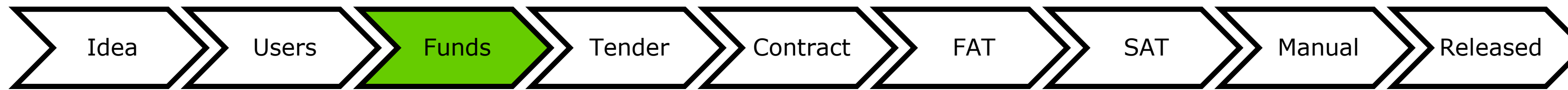
Spin Coater: Gamma E-beam and UV

- Part new possibilities, part back-up; 100% nice
- In-line HMDS priming
- 4 hotplates, 1 cool plate
- 4/6" coater station
  - AZ5214E
  - MIR 701
  - AZ 4562
  - CSAR 62
  - EBR
- 2" coater station
  - AZ5214E
  - CSAR 62
  - Syringe dispense
  - One available low visc. line
  - EBR
  - DUV coater backup
- SAT in July 2017
- Expected release in Q4 2017



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Chemical Mechanical Polishing (CMP) Tool

Key features

- Logitech Orbis
- For ultra smooth polishing of oxides

Auxiliary tools

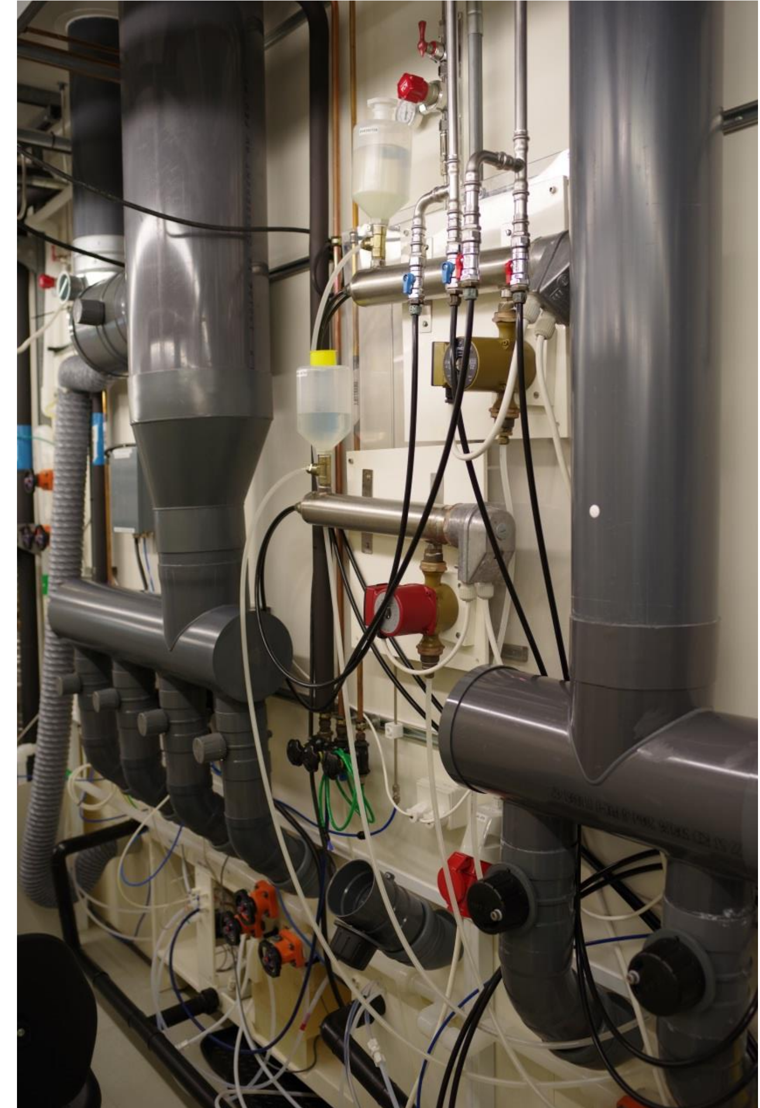
- Brush cleaner
- Megasonic cleaner

Old III-V lab will be converted to PVD central

- All wet III-V activities have moved to Ballroom (D-3)
- Space needed for other tools, e.g. new PVD tool
- Fume hoods will be thrown out – new Labmodul fume hood will stay
- Old furnaces will stay
- Small fume hood in A-4 will also be thrown out
- Shelves will be moved
- Microscopes will be moved
- Step profiler will be discarded – or moved

Upcoming Cleanroom Disturbances

- Temperature control (hopefully) fixed
- Clearing out old stuff
  - A-5 (old III-V lab): Fume hoods, microscopes, profilers, shelves
  - A-4: Small III-V fume hood
  - A-1: Old KOH fume hood
  - C-1: Old wet benches and fume hood
  - DIW shutdown
  - Being planned for October-November



Tools leaving the cleanroom

- SVG spin track (will be replaced by Gamma 4M)
- Old wet benches & fume hoods in A-5, A-4, A-1 and C-1 (replaced by new)
- PECVD 2 (replaced by PECVD 4)
- RIE 2 (will leave by end of 2017)
- Old Dektak in III-V room