EPFL Center of MicroNanoTechnology
10
Year Celebration
1999-2009

2011 : TUESDAY MAY 17TH

EPFL MICRONANOFABRICATION ANNUAL REVIEW MEETING

ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

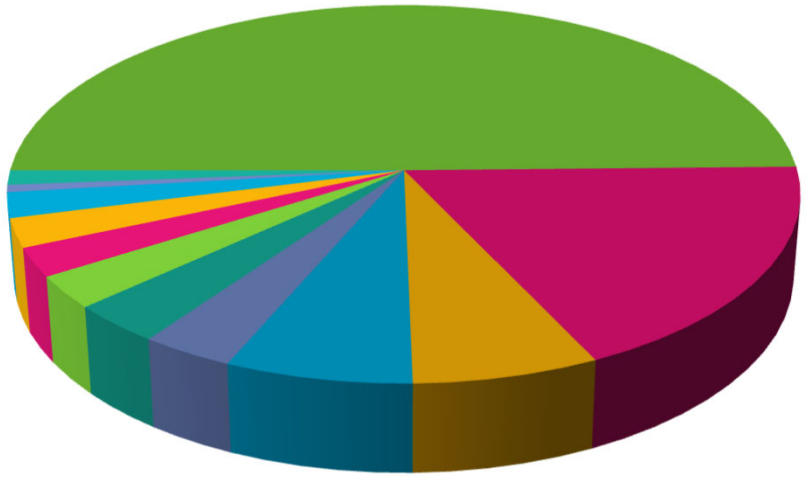
CMi EPFL Center of
MicroNanoTechnology

WELCOME & THANKS

- Welcome !
- Many thanks:
  - Many thanks to the speakers of this meeting
  - Many thanks to the users of the CMi for submitting 163 abstracts
  - Many thanks to Claudia and Karine for organizing the meeting
  - Many thanks to the EPFL who is strongly supporting the CMi
  - And last but not least thank you to all of you for taking the time to be here

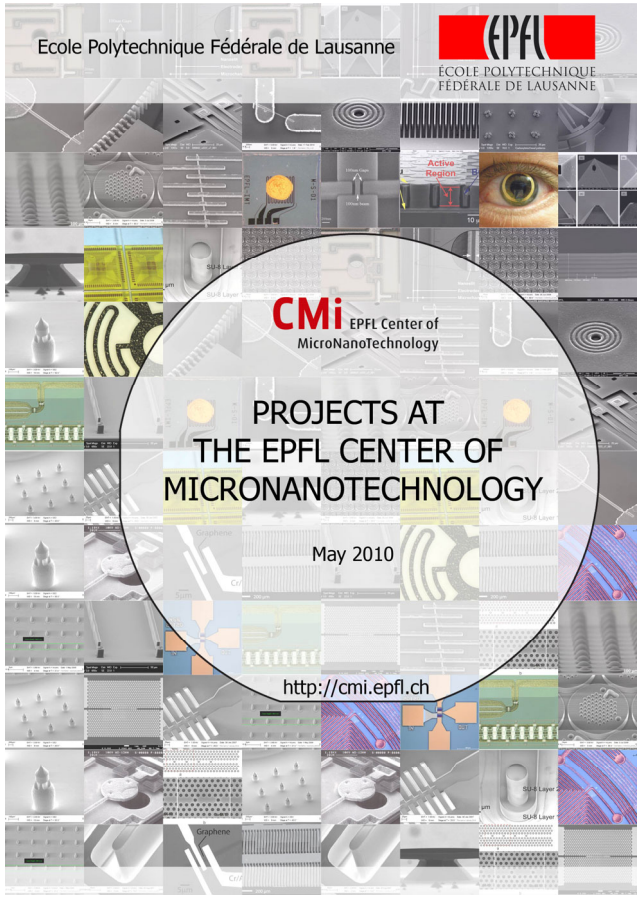
PARTICIPANTS

Total: 324 participants (+6%)



This is quite an interesting mix of population for technology transfer !

ABSTRACTS



163 abstracts from :	
37	laboratories of EPFL (STI, SB, SV)
6	external laboratories
16	private companies

+12 % in 2010 compared to 2009

Field	# of abstracts
MEMS	42
BioEngineering	36
Electronics	26
Materials	21
Optics	20
Fabrication	18

USERS IN 2009

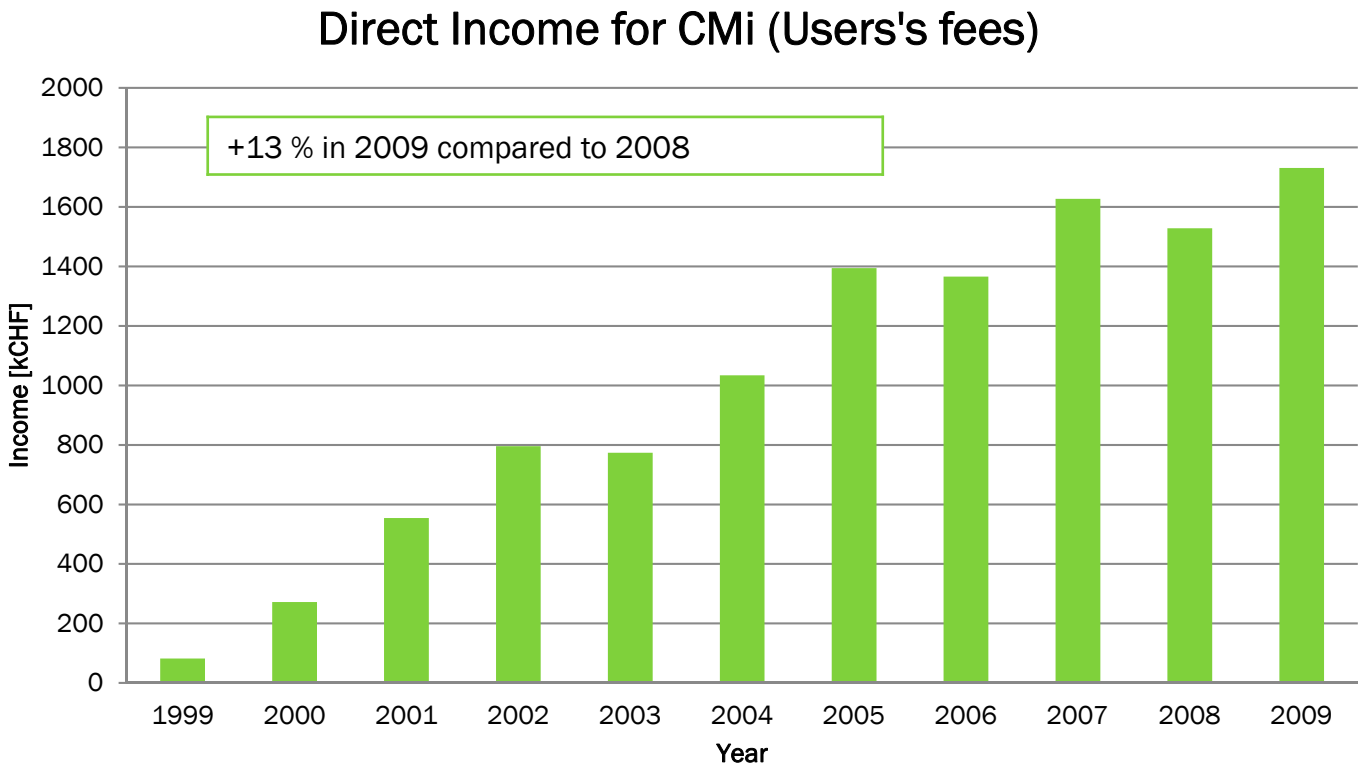
- 286 users in total
  - 231 users from EPFL labs
  - 55 users from outside of EPFL
- 40 laboratories of EPFL
- 10 external research laboratories
- 19 private companies
- Several new labs in the ramp-up phase
- … and more to come!!!

At the end of the day it is really a great benefit to have all these labs sharing experience within the same platform !

	Internal		External	Companies
1	IC-ISIM-LSI1	De Micheli	EXT-CSEM	Advanced Silicon
2	IV-CEN	Püttgen	EXT-EMPA	Ayanda Biosystems
3	SB-CIME	Hébert	EXT-ETHZ-Roesgen	Biocartis
4	SB-ICMP-LASPE	Grandjean	EXT-FEMTO-ST-MIMU	Bruker BioSpin
5	SB-ICMP-LOEQ	Deveaud Plédran	EXT-HEARC	Colibrys
6	SB-ICMP-LPN	Kapon	EXT-HESVS	Debiotech
7	SB-ICMP-LPQM1	Kippenberg	EXT-HUG	Flowdit
8	SB-ICMP-LPMC	Forro	EXT-PoliTorino	Gersteltec
9	SB-ISIC-LCPM	Rizzo	EXT-UNIGE-Lisunova	Icoflex
10	SB-ISIC-LEPA	Girault	EXT-UNIGE-Renner	MEAS Switzerland
11	SB-ISIC-LPI	Graetzel		Karmic
12	STI-CMI	Renaud		Leister
13	STI-IBI-CLSE1	Guiducci		MCH-processing
14	STI-IBI-LBEN	Radenovic		Microsens
15	STI-IBI-LBNC	Maerkl		Nanoworld
16	STI-GR-SCI	Sallèse		Rolex
17	STI-IEL-LANES	Kis		Sensimed
18	STI-IEL-LSM	Leblebici		Sigatec
19	STI-IEL-NANOLAB	Ionescu		SilMach
20	STI-IMT-ESPLAB	Farine		
21	STI-IMT-LAI	Perriard		
22	STI-IMT-LMIS1	Brugger		
23	STI-IMT-LMIS2	Gijs		
24	STI-IMT-LMIS3	Popovic		
25	STI-IMT-LMIS4	Renaud		
26	STI-IMT-LMTS	Shea		
27	STI-IMT-LO	Psaltis		
28	STI-IMT-LOA	Depeursinge		
29	STI-IMT-LOB	Lasser		
30	STI-IMT-LPM	Ryser		
31	STI-IMT-LSRO2	Clavel		
32	STI-IMT-NAM	Martin		
33	STI-IMT-OPT	Herzig		
34	STI-IMT-SAMLAB	de Rooij		
35	STI-IMX-LC	Muralt		
36	STI-IMX-LMM	Mortensen		
37	STI-IMX-LMSC	Fontcuberta		
38	STI-IMX-LP	Klok		
39	SV-GHI-UPKIN	McKinney		
40	SV-IBI1-UPLUT	Lutolf		

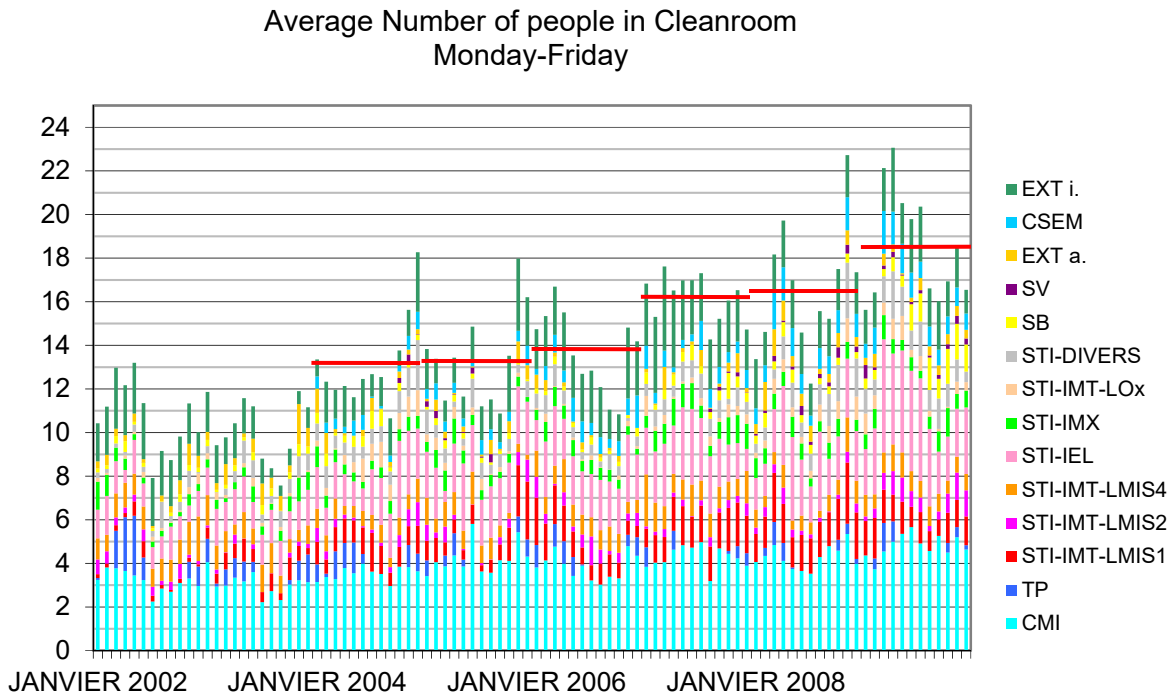
VOLUME OF ACTIVITY

- Volume of activity



POPULATION IN THE CLEANROOM

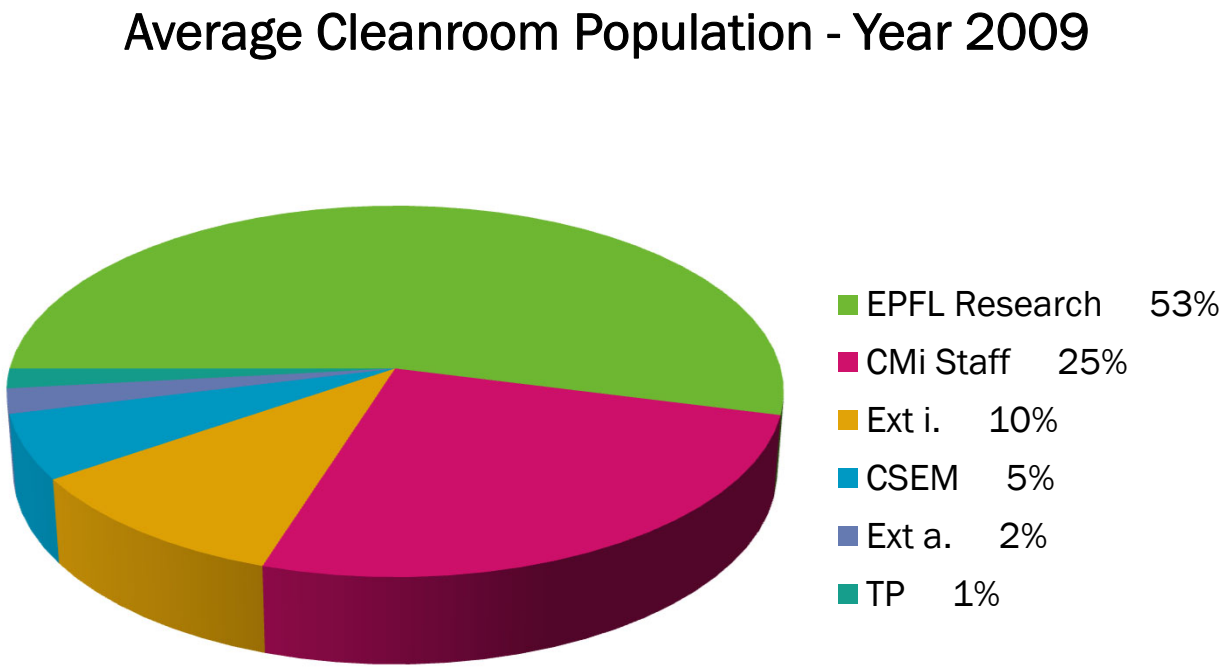
- Cleanroom occupancy 2002-2009



2004	13.1	people 8h/day
2005	13.3	people 8h/day
2006	13.7	people 8h/day
2007	16.2	people 8h/day
2008	16.5	people 8h/day
2009	18.5	people 8h/day
+12% in 2009 compared to 2008		

... but also peaks with more than 30 users simultaneously in the cleanroom !

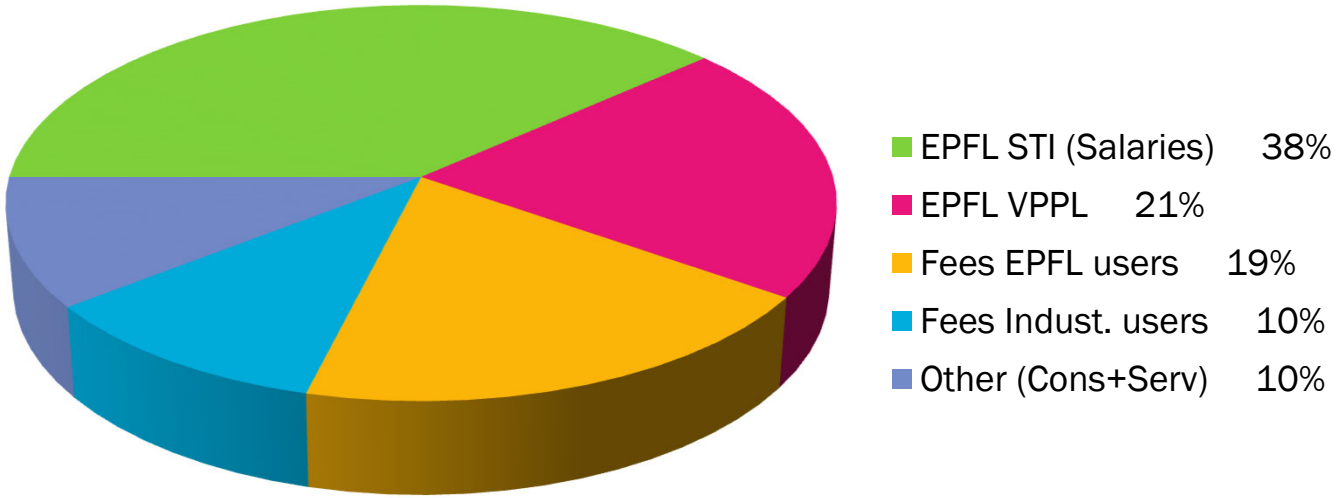
POPULATION IN THE CLEANROOM



The presence of the staff in the cleanroom is a key factor for user's satisfaction and success rate !

FINANCES

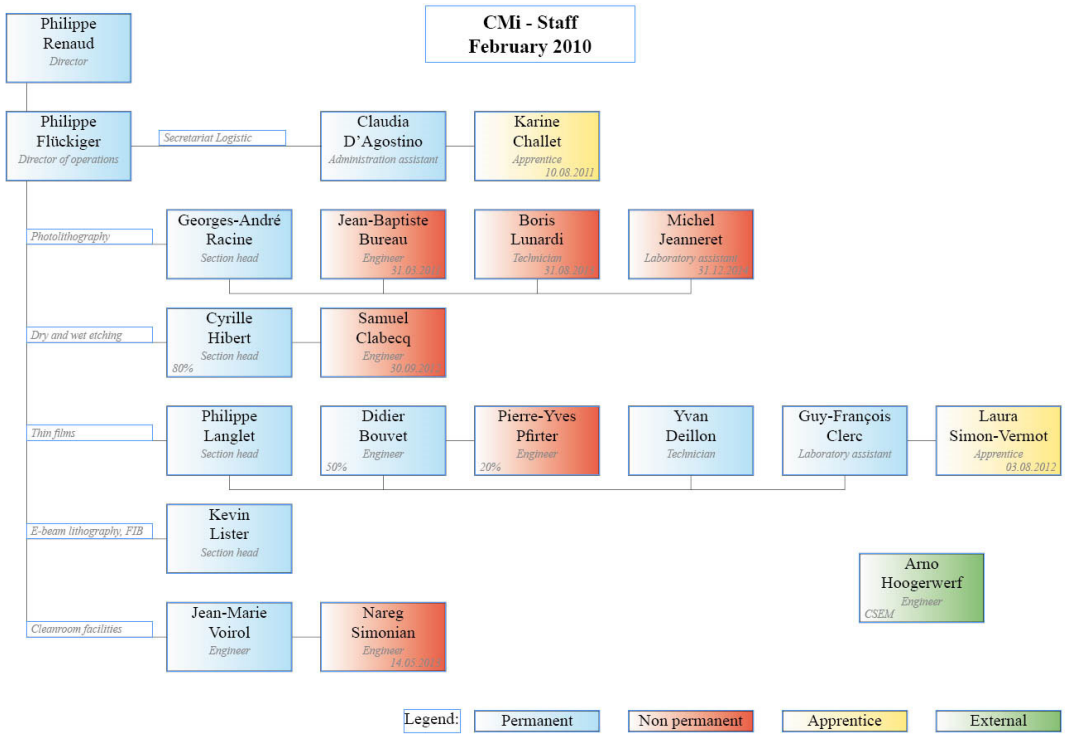
Coverage of the running costs - Year 2009



Total of the running costs for 2009: 3'990kCHF

HUMAN RESOURCES

- Human Resources
  - + 14.5 FTE
    - × 10 CDI
    - × 6 CDD
    - × 11 Engineers
    - × 4 Technicians
    - × 1 Adm. Ass.
    - × 2 Learners



INVENTORY

- Inventory 2009 in MCHF

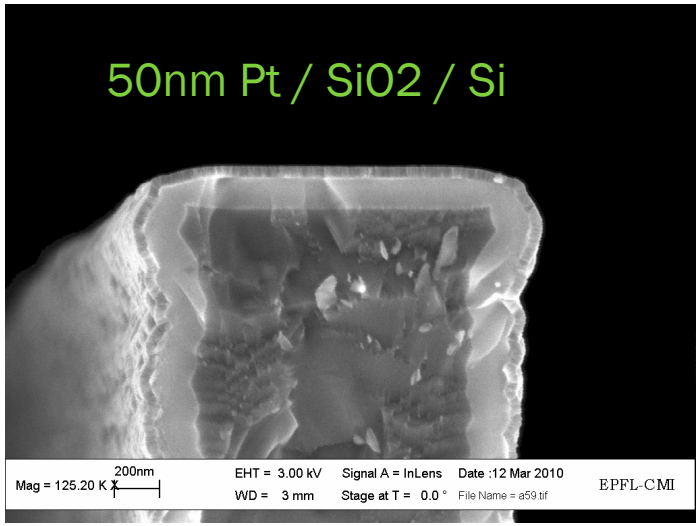
Infrastructure	13 MCHF
Scientific Equipment	22 MCHF
Total	**34 MCHF**

- More than 70 pieces of equipment with a very high uptime
- Several tools close to saturation

NEW EQUIPMENT ORDERED

- Atomic Layer Deposition System

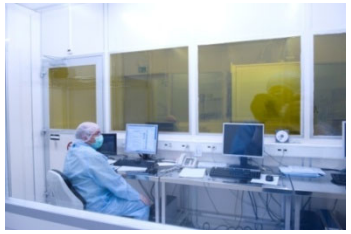
Oxides:	Al2O3
	TiO2
	HfO2
Nitride:	TiN
Metals:	Pt
	Ru



- Beneq TFS 200
- To be delivered in October 2010
- Funded 1/3 by SNSF R'Equip (Prof. Ionescu) and 2/3 by EPFL-VPAA

TRENDS IN MICRO- NANO- TECHNOLOGIES

CMI tools ...



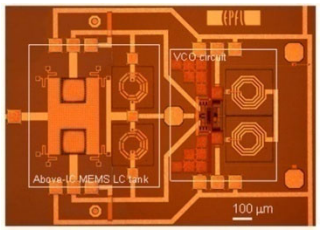
CMi + EPFL Center of MicroNanoTechnology

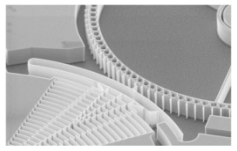
Bio

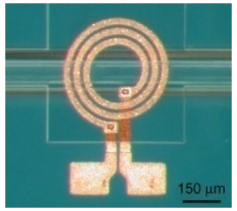
Nano

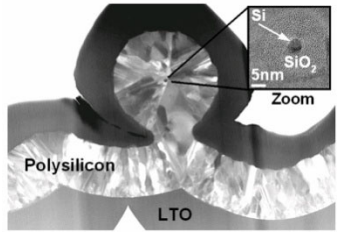
MEMS

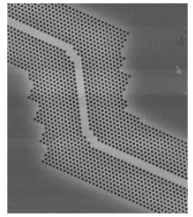
IC

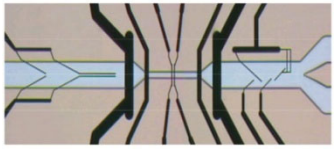


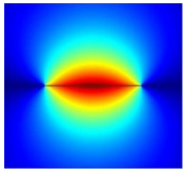












CMI projects ...

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CMi EPFL Center of MicroNanoTechnology

CMI+ CONCEPT

- CMi+ is a program for extension and adaptation of CMi which was launched in anticipation of new needs for research and education at EPFL

- Key Objectives
  - Allow access to a broader technology base, as a complement to existing CMi platform (e.g. nanomaterials, polymers, new substrates…)
  - Increase flexibility of use, allow for quick and easy processing
  - Adapt the cost structure to new needs
  - Further promote collaborations and sharing of know-how between users
  - Offer space for teaching lab in nano and nanobiotech

- How
  - Create a new laboratory space with « more freedom, less support »
    - quick and easy access to the infrastructure
    - permanent access (open 24/7)

→ CMi zone B

CMI+ CONCEPT

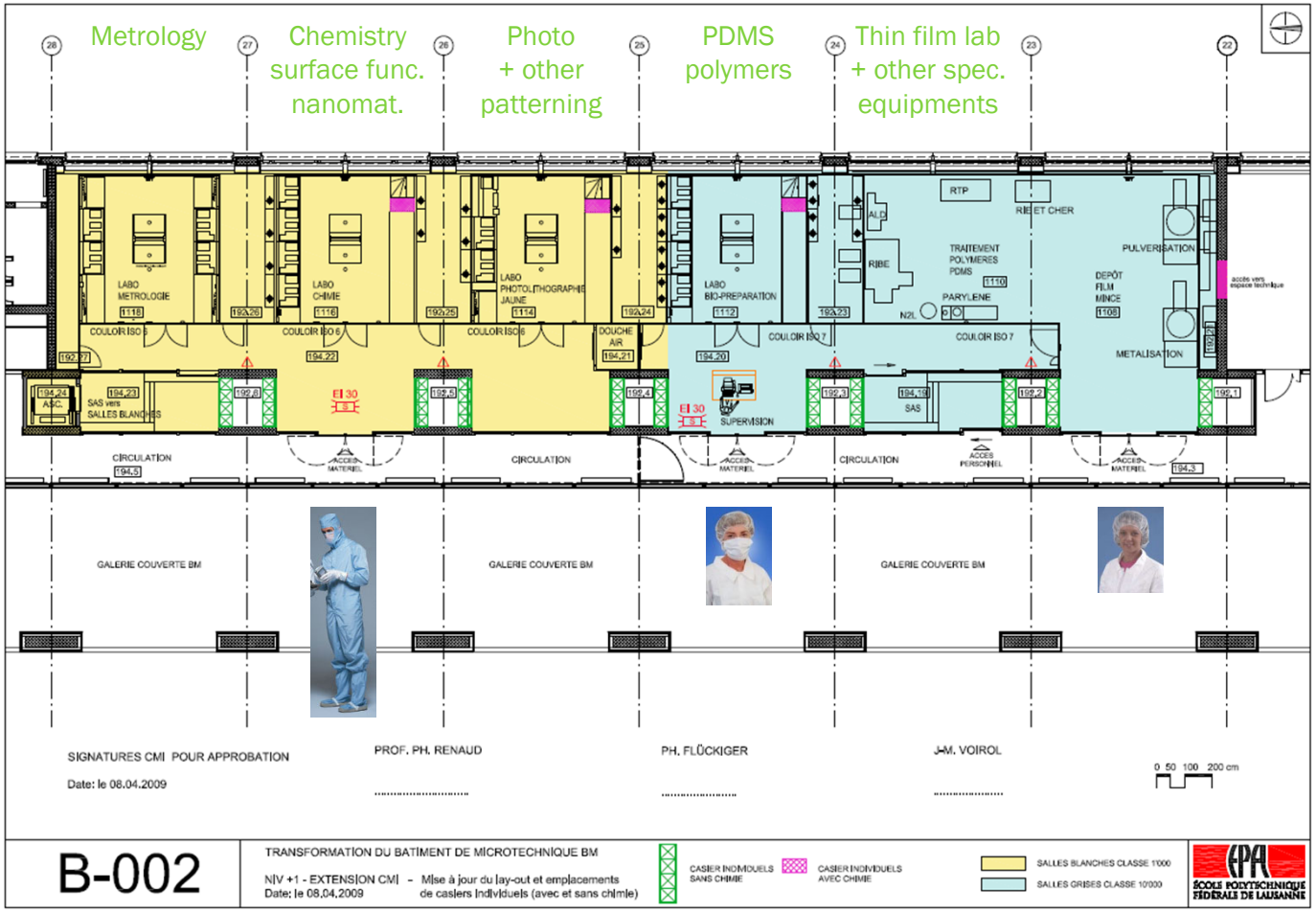
- The + is an add and not a degradation of the existing CMi !

CMI+ BUDGETS & AGENDA

- Agenda

Cleanroom Extension Ready	September 2010
Laboratory Furniture	September 2010
Scientific Equipment - First Processing Tools	Autumn 2010 ?

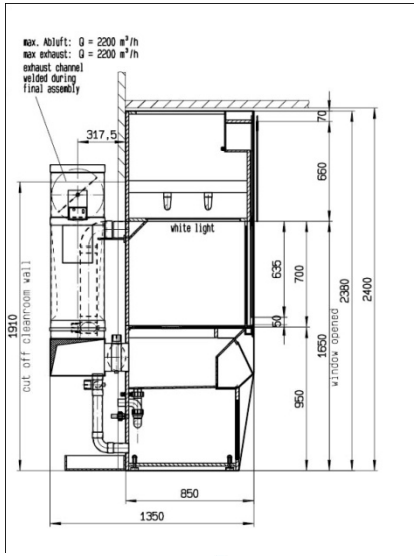
CLEANROOM ZONE B

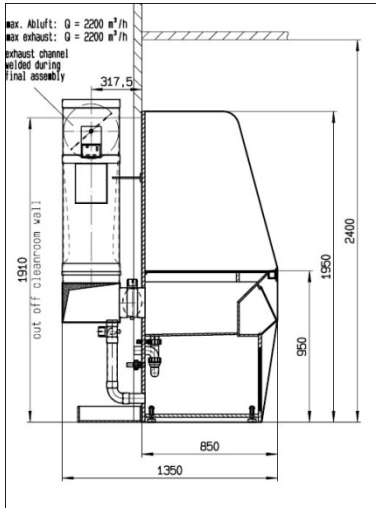


- 400m2
- Class 1000
- Class 10000
- Separate entrance
- Elevator

CMI+ FURNITURE

- Fume hoods
- Wet benches
- Storage cabinets
  - + Chemicals
  - + Tools
  - + Personal items

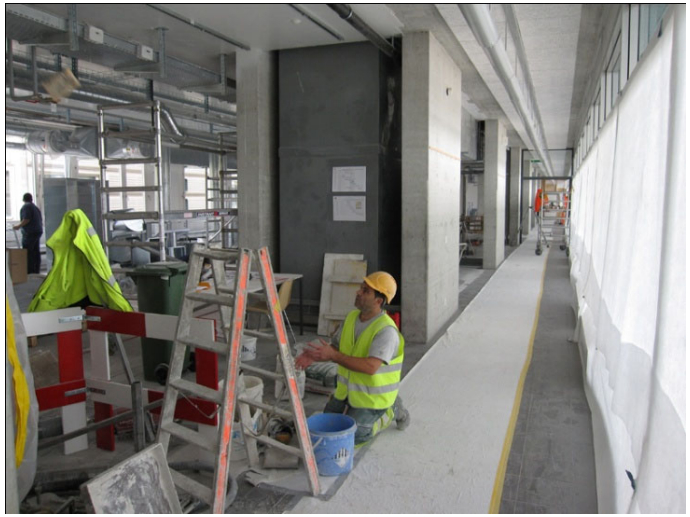




CMI+ CLEANROOM

- Many thanks to the Project Leader, Youssef Belkacem, and to all the companies involved, for their professionalism and for the very good relationship
- Many thanks to Jean-Marie Voirol who is playing a central role in the project

CMI+ CLEANROOM

CMI+ CLEANROOM

CMI+ SCIENTIFIC EQUIPMENT

- CMi Board

CMI+ SCIENTIFIC EQUIPMENT

- Proposal!

Cost:	2010	2011	2012
Metrology			
Optical Microscope (refurbished, emmicroelectronic)	0		
SEM (old system, currently in zone A)	0		
EBL kit for SEM		80	
Film stress measurement system			90
AFM (R'Equip, J. Brugger, on hold)		300	
Chemistry + Surface Functionalization + Nanomaterials			
Fume Hood (refurbished, Pulse MEMS)	0		
Glove box for nanoparticles (2x)	20	20	
Spin wet processor	35		
Dish washer for chemistry glassware		10	
Electroplating station + diagnostic tools		25	
Photolithography + Other Patterning			
HMDS furnace	75		
Spin coaters (1x for resit, 1x for SU8)	10		
Mask Aligner	250		
Hotplate	5		
Photolithography bench (New)	30		
Oven (refurbished, Heraus, Pulse MEMS)	0		
Optical Microscope (refurbished, emmicroelectronic)	0		
Inkjet or material printer or microplotter		50	
Dry film resist laminator	0		
Direct writing system	150		

CMI+ SCIENTIFIC EQUIPMENT

- Proposa!

PDMS + Polymers Processing			
Wet Bench (refurbished, Pulse MEMS)	0		
Spin coater	10		
PDMS mixer	15		
Alignment microscope & hole puncher	20		
Hot press	15		
UV-Ozone cleaner for surface modif.	10		
Table top nanoimprint machine		15	
Nanoimprint/hot embossing machine			400

Thin Films Lab + Other Specific Equipments			
Plasma O2	45		
Evaporator (Refurbished)	0		
Single wafer 4" evaporator (Refurbished)	0		
Table top sputterer	50		
Thermal evaporator (8 creusets de 15cc)		300	
DC/RF sputtering system			300
PLD system + eximer ablation + laser	0		

Other			
small equipments, electronics, microscopes, acessories	80		
small equipments, electronics, microscopes, acessories		120	
small equipments, electronics, microscopes, acessories			50

Zone B - Investment per year	670	920	990
Zone B - TOTAL:			

New general purpose CMi equipments			
Grinder for wafer thinning (request sent to VPAA on Oct. 2009	300		
Scanning Electron Microscope		500	

General purpose CMI equipment per year	300	500	0
New CMI equipment TOTAL:			

CMI+ SCIENTIFIC EQUIPMENT

- Please continue to tell us your needs !

CONCLUSIONS

- Since its opening in 1999, CMi has constantly increased its volume of activity
- CMi preparing the future

EPFL MICRONANOFABRICATION ANNUAL REVIEW MEETING

ENJOY THE CONFERENCE

- Enjoy the conference!
  - WiFi Access
    - See last page of the Participants'List
      - Username: x-cmi1
      - Password: mimlob84
      - Type d'accès: enclair (SSID public-epfl)

PROGRAM

- 10h20-10h40 Sebastian Maerkl (http://lbnc.epfl.ch), Next Generation Microfluidics: Software Programmable Devices
- 10h40-11h00 Andras Kis (http://lanes.epfl.ch), Electronic Devices Based on Layered Materials
- 11h00-11h20 Ch. Yamahata (http://lmis2.epfl.ch), A Monolithic Stepper Micromotor with a Flexural Pivot Bearing
- 11h20-11h45 Break
- 11h45-12h00 Mona Klein (http://www.csem.ch), Wafer-Scale Nanopatterning Using Self-Assembled Polymeric Masking Patterns
- 12h00-12h15 Gatien Cosendey (http://laspe.epfl.ch), III-Nitride Based Optoelectronic Devices
- 12h15-12h30 Sebastiano Merzaghi (http://lai.epfl.ch), Development of an Electromagnetic MEMS Micromotor
- 12h30-14h00 Lunch & Poster Session
- 14h00-14h15 Marion Hermersdorf (http://nanolab.epfl.ch), High Aspect Ratio Sub-Micron Trenches on Silicon-On-Insulator
- 14h15-14h30 Atatuna Ciftlik (http://lmis2.epfl.ch), Fabrication of a High Pressure Microfluidic Chip with Double Metal Layer for Self-Packaged and Fast Assembled BioMEMS Applications
- 14h30-15h00 Break
- 15h00-15h15 Veronica Savu (http://lmis1.epfl.ch), Nanopatterning on 3D Landscapes
- 15h15-15h30 Nicolas Demierre (http://www.biocartis.com), Encoded Microparticles for Multiplexed Analysis in Molecular Diagnostics
- 15h30-17h00 Cocktails & Poster Session