

# User Fees for the 4D LABS Fabrication Facility

## 1. Clean Room Fees

Service	Academic Rate
Clean Room access:	
<ul style="list-style-type: none"> <li>Includes use of all Clean Room tools except for those in the groups listed below</li> </ul>	\$20/hr
Group I tools:	
<ul style="list-style-type: none"> <li>Plasma reactors</li> <li>Probe station</li> </ul>	\$10/hr
Group II tools:	
<ul style="list-style-type: none"> <li>Mask aligner 1 and 2</li> <li>Nanoimprint lithography</li> <li>Physical vapor deposition 1, 2, 3, and 4</li> <li>RIE 2 (fluorine-based system)</li> <li>Rapid thermal annealer 1 and 2</li> <li>Critical point dryer</li> <li>XeF<sub>2</sub> etcher</li> <li>Atomic layer deposition</li> <li>Wafer bonder</li> </ul>	\$20/hr
Group III tools:	
<ul style="list-style-type: none"> <li>RIE 1 (chlorine-based system)</li> <li>Direct write laser lithography</li> <li>Thermal SiO<sub>2</sub> growth and P-diffusion</li> </ul>	\$30/hr
Group IV tools:	
<ul style="list-style-type: none"> <li>Electron beam lithography</li> <li>LPCVD (Si<sub>3</sub>N<sub>4</sub>, polysilicon)</li> <li>PECVD (SiO<sub>2</sub>, Si<sub>3</sub>N<sub>4</sub>, Si)</li> <li>Deep Reactive Ion Etcher</li> </ul>	\$40/hr
Training	\$40/hr
Technical Labor Rate	\$75/hr

## 2. Non-Clean Room Fees

Service	Academic Rate
Glove Box (TASC2 6140)	
<ul style="list-style-type: none"> <li>Standard usage</li> <li>Evaporator usage</li> </ul>	\$15/hr \$45/hr
High Temperature Furnace or Vacuum Oven (TASC2 6070)	\$2.50/hr
Laser Machining Lab (TASC2 6072):	
<ul style="list-style-type: none"> <li>Dicing Saw</li> <li>Laser Scriber</li> <li>Laser Micromachining</li> </ul>	\$40/hr \$30/hr \$40/hr
PVD 5 (TASC2 6140)	\$40/hr
Wet Lab and Polymer Coating Tooling (TASC2 6074 and 6076):	
<ul style="list-style-type: none"> <li>Wetbench 6 (Electroplating)</li> <li>Wetbench 7 (Acid Cleaning)</li> <li>Wetbench 8 (General Solvent)</li> <li>Wetbench 9 (Organic Cleaning)</li> <li>Spray Coater/Screen Printer</li> <li>Hot Press</li> </ul>	\$40/hr \$20/hr \$20/hr \$20/hr \$20/hr \$5/hr
Training	\$40/hr
Technical Labor Rate	\$75/hr

### 3. Mask Fabrication Fees

Service	Academic Rate
<p><b>Mask Writing</b></p> <p>The rate includes developing, etching, and cleaning of photomask. Rates also include costs for packaging.</p> <p>Write times longer than 2 hrs will be charged at a rate of \$60/hr. The minimum charge for using the 4mm and 2mm lens is \$180/mask.</p> <p>The write time is determined primarily by the total area of the design, <i>including</i> white spaces, and the minimum feature size.</p> <p>Our standard photomasks are 4" x 4" or 5" x 5" chrome on soda-lime glass. Other sizes and materials may be available on a custom order basis at an extra cost.</p>	<p>\$120/mask</p>
<p><b>Shipping and Handling within Canada (2 business days)</b></p> <p>Rates may vary for shipping multiple masks, priority shipments, or sending outside of Canada</p>	<p>\$20/mask</p>

## 4. Materials and Supplies<sup>†</sup>

Product	Cost
Clean Room gowns:	
• gown set lease (incl. gown, hood, and boots)	\$300/user
• rack spot/cleaning fee (approximately every three weeks)	\$7/cleaning
• rental	\$20/week
Clean Room notebook	\$15
Safety goggles	\$10
Lab coat	\$50
Tweezers:	
• ESD-safe carbon-tip wafer tweezers (multiple sizes)	\$62
○ Replacement tip for 2" wafer	\$25
○ Replacement tip for 4" wafer	\$25
○ Replacement tip for 6" wafer	\$56
○ Replacement tip for fine pieces	\$23
• ESD-safe carbon-tip wafer tweezers for 6" wafers	\$142
• Metal tweezers for small pieces	\$42
PVD metal charge:	
• platinum	\$0.45/nm
• gold	\$0.65/nm
• palladium	\$0.50/nm
• ITO	\$0.35/nm
• others PVD materials	\$0.03/nm
ALD metal charge:	
• aluminum nitride	\$1.00/nm
• aluminum oxide	\$1.00/nm
• hafnium oxide	\$2.25/nm
• platinum	\$10/nm
• silicon oxide	\$1.00/nm
• zinc oxide	\$1.00/nm
• passivation after zinc oxide	\$230

Wafers:

• 2" silicon wafer (100), prime grade	\$20
• 2" silicon wafer (100), prime grade, double-side polished	\$35
• 2" silicon wafer (100), prime grade, 100 nm dry oxide	\$69
• 2" silicon wafer (100), prime grade, 100 nm dry nitride	\$75
• 4" silicon wafer (100), prime grade	\$28
• 4" silicon wafer (100), reclaimed	\$10
• 4" silicon wafer (100), prime grade, 100 nm dry oxide	\$77
• 4" silicon wafer (100), prime grade, 100 nm nitride	\$83
• 4" silicon wafer (100), prime grade, double-side polished	\$90
• 4" glass wafer, soda-lime, double-side polished	\$45
• 6" silicon wafer (100), test grade	\$38
• 6" silicon wafer (100), test grade	\$70

Wafer Carriers:

• 2" carrier for individual wafers	\$6
• 2" carrier for 25 wafers	\$15
• 4" carrier for individual wafers	\$20
• 4" carrier for 25 wafers	\$30
• 6" carrier for individual wafers	\$39

Gel-Pak for wafer pieces \$8

Bare Glass Plates:

• 4" soda-lime glass	\$15
• 5" soda-lime glass	\$20

Mask Carriers:

• 4" mask carrier	\$15
• 5" mask carrier	\$10

Nanoimprinter sealing film set \$350

Steel shim for shadow masks \$30

Spray coater syringe \$325

<sup>†</sup> Note: The prices listed in this table are valid as of September 2023. The prices may without notice vary according to the market price.

## 5. Academic Breakpoints for Service Fees in the Fabrication Facility

Cumulative User Monthly Usage	SFU Academic Discount*
\$0 → \$200	0%
\$200 → \$400	50%
> \$400	100%

Cumulative Group Monthly Usage†	External Academic Discount*
\$0 → \$500	0% <sup>††</sup>
\$500 → \$1250	50%
> \$1250	75%

\* Discounts are not applied toward materials purchases (*e.g.*, metals, tweezers, gowns, etc.), photomask orders, or contract work.

† The cumulative group usage is for a single Principal Investigator regardless of the number of users.

### *Rules and Regulations:*

1. Users of the Fabrication and Prototyping Facility must be qualified on each tool used. This must be done through technician training at rates listed above. Training times will vary based on the complexity of the tool and the experience of the user.
2. Minimum usage is one half hour for all equipment.
3. External academic users who wish to have a 4D LABS technician run a sample for them (e.g., sample preparation, data acquisition, and data processing) will have to make these arrangements through 4D LABS ([info@4dlabs.ca](mailto:info@4dlabs.ca)). Cost estimates can be compiled based on a 10, 5, or 1 day turnaround time.
4. Invoices are normally sent on a monthly basis and payments can be made by cheque or account transfer (internal users only).
5. Payments are due Net (30) days from invoice date. Past due invoices are subject to a service charge of 1.5% per month (18% annual) on the unpaid balance or the maximum legal rate permitted by provincial law, whichever is lower.

### *Special Notes:*

1. The Clean Room access fee includes access to standard clean room resists, developers, solvents, and acids.
2. Gown leases are assigned to a specific user. When that person leaves, the lease cannot be transferred to another user.
3. There are separate fees for Clean Room access and for usage of each machine in the Clean Room.
4. Guest visitors to the Clean Room, including supervisors, must be pre-approved by the staff and will be charged a flat rate of 1 hour of Clean Room time plus a gown rental per instance of admittance into the Clean Room.
5. All normal operation of PVD systems including venting, pumping, and deposition, is billable time. Samples remaining in the chamber overnight after a recipe deposition are not charged, but the ticket needs to resume for unloading the sample the following morning.
6. All PVD depositions need to be recorded using the correct material or "Other PVD Materials".
7. For the high-temperature furnace in TASC2 6070, the time charged will include ramp-up time, bake time, and up to 1 hour of cool-down time.
8. For ellipsometer modeling, EBL pattern design, and photomask design, please use the computer station located in TASC 2 room 6140. There is no cost to users for access to this station.
9. Lockers are available outside the Clean Room for a nominal charge of \$1/day.
10. The RTA has a setup fee of \$50 for using the pyrometer for high temperature work.