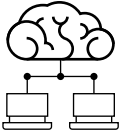


# Canadian Photonics Fabrication Centre (CPFC)

Transforming compound semiconductor materials into devices that generate, manipulate and detect photons

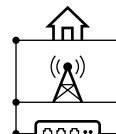
Photons are particles of electromagnetic energy, such as light, radio waves and X-rays. They travel at the speed of light and are the fastest way to transmit data.

## Where are photonic devices used?



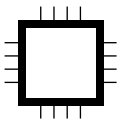
### AI infrastructure

Photonic devices are essential for the high-bandwidth connections in AI data centres. Photonic-based AI hardware has much lower cooling needs than setups that use conventional copper cables, which greatly reduces cost and environmental impact.



### The internet

Photonic devices are needed at each fibre optic cable connection point along the transmission of data.



### Other areas

- Defence and aerospace
- Light detection and ranging (LiDAR) technology
- Medical imaging and treatment
- Satellite communication
- Quantum computing
- Virtual reality

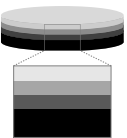
We have made over 100 million devices in the past 5 years

## How are photonic devices made?



### 1 Base layer

Substrate, or shiny disc, made of semiconductor critical minerals



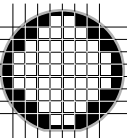
### 2 Epitaxial growth

Addition of atomic layers of material on the surface of the disc



### 3 Processing

Carving the material to create a custom pattern



### 4 Cleaving

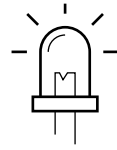
The disc, now called a wafer, is split into individual units



A single unit is called a photonic device

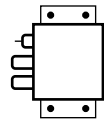
One wafer can yield thousands of photonic devices

## How do photonic devices function?



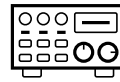
### Lasers

Convert electrical current into photons



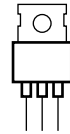
### Modulators

Manipulate photons to encode data



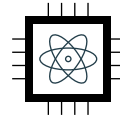
### Amplifiers

Enhance the optical power of signals



### Detectors

Detect photons and convert into electrical current



### Photonic integrated circuits

Combine multiple devices on a single chip

Transmitting large amounts of data with photonics saves energy and reduces costs compared to electronics

Photonic devices can be as small as a grain of sand

## CPFC timeline

