



Products & Services Catalogue

Commercial

APRIL 2022



www.CMC.ca/sales



Lowering Barriers to Technology Adoption

CMC Microsystems has more than 35 years experience supporting R&D across a range of technology areas, including microelectronics, photonics, MEMS, and superconducting devices. CMC lowers barriers to technology by providing access to state-of-the-art tools, technologies and packaging supported with training and expertise for first-time-right prototypes.

Contact sales@cmc.ca about accessing technologies or to discuss your project.



Table of Contents



- 4 ▶ Virtual Incubator Environment (VIE) Program for Startups in Canada
- 5 ▶ Training
- 6 ▶ Strategic Technologies
- 7 ▶ Prototyping Services and Technologies
- 7 ▶ Multi-Project Wafer Fabrication Services
- 15 ▶ Packaging & Assembly
- 16 ▶ Cadence Cloud Passport Program
- 17 ▶ CMC SponsorChip™ for Companies
- 19 ▶ Platform Solutions
- 20 ▶ Contract R&D

Academics in Canada: view  www.CMC.ca for expanded/entire set of tools available to Canada's National Design Network (CNDN)®.



Virtual Incubator Environment (VIE) Program

for Startups in Canada

Features a new CMC Microsystems® bundle of design tools and technologies enabling startups and SMEs to accelerate their design of innovative products.



PROGRAM COMPRISES:

- ✓ Commercial licenses for a selection of Computer Aided Design (CAD) tools available to researchers through CMC cloud design environments
- ✓ Access to state-of-the-art fabrication services for prototyping in Microelectronics, Silicon Photonics, Micro-ElectroMechanical Systems (MEMS), and Superconducting Quantum Devices, a cost-effective service using our multi-project wafers
- ✓ R&D services to support Artificial Intelligence, Machine Learning, and Quantum Computing, using hardware and software

The VIE program is available to startups in Canada

Price: \$2,000/year

Contact sales@cmc.ca to discuss options.

Did You Know?

In the past 25 years, CMC has enabled **250 startups** by providing streamlined access to advanced technologies and expertise.

Training

CMC offers more than 20 training courses and workshops on tools and technologies throughout the year.

CMC Basecamp™ specialized training introduces engineers and scientists to advanced technologies, faster. These courses provide a unique combination of theory and lab work through a design/fabrication/test cycle of your very own microchip. Learn to design hardware using the advanced technologies that will power tomorrow's 5G communications, artificial Intelligence, edge computing, quantum computing, and photonics-based sensors and systems.

CMC Basecamp™ is a suite of training courses which streamline researcher's access to advanced technologies. www.CMC.ca/basecamp



BASECAMP

CMC BASECAMP™ COURSES TYPICALLY INCLUDE

- ✓ An intensive 2 to 3 weeks of tutorials, lectures, and workshops with tools for design and simulation
- ✓ CAD tool access for completion of the design (restrictions apply)
- ✓ Fabrication of the design using Multi-Project Wafer services offered through CMC
- ✓ Support for Testing (options vary with course)

SELECT YOUR BASECAMP

- ☐ SiEPIC Passive Photonics
- ☐ SiEPIC Active Photonics
- ☐ Advanced CMOS design (12 nm FINFET)
- ☐ Superconducting circuits
- ☐ Silicon Interposers*
- ☐ Electronic Sensor Platform*
- ☐ RF*

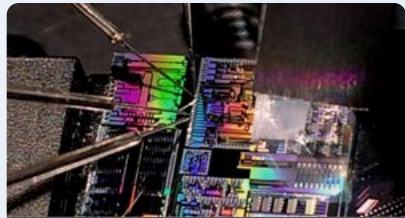
*Coming soon

Strategic Technologies

CMC's technology drivers are underpinned by the following technology areas: IoT & Edge AI, Microelectronics, MEMS, Photonics and Quantum Computing, which are enabling progress in numerous scientific disciplines. These microsystem technologies also contribute to innovative applications in many industrial sectors.



Microelectronics



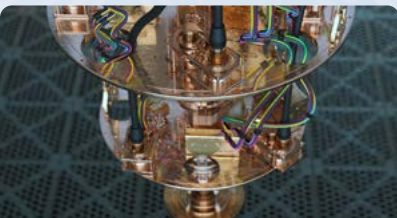
Photonics



IoT & Edge AI



**Micro Electro-Mechanical System (MEMS),
Nanofabrication and
Integration**



Quantum Computing

Prototyping Services & Technologies

Multi-Project Wafer Fabrication Services

Cost-shared access to multi-project wafer (MPW) runs, services include manufacturability checks, design rule checks (DRC), training and tutorials. Pricing and area minimums will be quoted on request.

For a list of upcoming runs visit the Fabrication Schedule:
competitions.CMC.ca/cmc/FabCalendar.aspx

For price options contact: sales@cmc.ca





CMC offers access to **AMF's silicon photonics fabrication services** supporting design and fabrication of a range of components in O-Band and C-Band and systems consisting of:

- ✓ Modulators and detectors
- ✓ Waveguides (strip or ridge)
- ✓ Gratings for fiber coupling
- ✓ Deep trench and nano-tapers for edge coupling
- ✓ Multiplexers (diffraction or arrayed waveguide) and filters (resonators, Bragg gratings) ring and disk resonators

Silicon Photonics General Purpose

Features

- Silicon-on-insulator, 220-nm top Si film
- High resistivity handle wafer (>750 ohm-cm)
- 193-nm deep UV lithography for waveguides, enabling features down to approximately 140 nm
- Two partial etches and one full etch of the top silicon
- 6 implants for optical modulators (P++, P+, P, N++, N+, N)
- Germanium deposition and implanting for photodetectors
- Two metal levels for routing and an additional level for metal heaters
- Front side oxide etch to selectively expose waveguides, e.g., for sensing applications
- Deep trench with etched facets for edge coupling

Contact sales@cmc.ca for price options.





CMC offers access to the **NanoSOI fabrication service** for prototyping silicon photonic integrated circuits:

- ✓ Waveguides (strip or ridge)
- ✓ Gratings for fiber coupling
- ✓ Deep trench and nano-tapers for edge coupling
- ✓ Multiplexers (diffraction or arrayed waveguide) and filters (resonators, Bragg gratings)
- ✓ Ring and disk resonators

NanoSOI

Features

- Silicon-on-insulator, 220-nm top Si film, 2000-nm buried oxide (BOX)
- 100 keV electron-beam lithography system enabling features down to 60 nm
- One full etch of the top silicon for standard MPW run, partial silicon etching will be available in near future
- Tri-layer TiW/Al metallization and TiW alloy heater are available
- Metal oxide window, deep trench for edge coupling and SEM imaging options are available
- Implants for optical modulators will be available in future

CMC offers access to the **Silicon Nitride (SiN) Fabrication Process** for prototyping silicon photonic integrated circuits:

- ✓ Waveguides (strip)
- ✓ Gratings for fiber coupling
- ✓ Deep trench and nano-tapers for edge coupling
- ✓ Multiplexers (diffraction or arrayed waveguide) and filters (resonators, Bragg gratings)

Silicon Nitride (SiN)

Features

- Silicon nitride with device layer thickness 400nm and buffer oxide Layer thickness 4.5um
- 100 keV electron-beam lithography system enabling features down to 120 nm
- Fully etched devices (etched down to the buffer oxide) are created using an e-beam mask material and anisotropic ICP-RIE etching process
- Tri-layer TiW/Al metallization and TiW alloy heater are available
- Metal oxide window, deep trench for edge coupling and SEM imaging options are available



CMC delivers the **AMS technology** from austriamicrosystems, offering three processes: Basic, Opto and High-Voltage.

0.35 μm CMOS – Basic

Features	Applications (technology suitable for)	Potential Applications
<ul style="list-style-type: none">• 3.3 V/5 V• 2P4M• C35B4C3 kit:<ul style="list-style-type: none">• Standard cell• IO/bondpads• Analog device library	<ul style="list-style-type: none">• Mixed-signal designs• High-speed digital circuits• For the Basic and Opto processes, bulk micromachining of MEMS structures	<ul style="list-style-type: none">• Biomedical imaging• Automotive and environmental sensors

0.35 μm CMOS – Opto

Features	Applications (technology suitable for)	Potential Applications
<ul style="list-style-type: none">• 3.3 V/5 V• 2P4M• anti-reflective coating• p-epi wafers (lower dark current)• C35B4O1 kit:<ul style="list-style-type: none">• Standard cell• IO/bondpads• Analog device library	<ul style="list-style-type: none">• Embedded photodiodes, high-density CMOS imaging and optoelectronic detection• Mixed-signal designs• High-speed digital circuits• For the Basic and Opto processes, bulk micromachining of MEMS structures	<ul style="list-style-type: none">• Biomedical imaging• Automotive and environmental sensors

0.35 μm CMOS – High Voltage

Features	Applications (technology suitable for)	Potential Applications
<ul style="list-style-type: none">• 3.3 V/5 V/50 V/120V• 2P4M• H35B4D3 kit:<ul style="list-style-type: none">• standard cell• IO/bondpads	<ul style="list-style-type: none">• High-voltage operation (maximum 20V gate, 120V operating voltage)• Mixed-signal designs• High-speed digital circuits	<ul style="list-style-type: none">• Biomedical imaging• Automotive and environmental sensors



CMC is a channel partner and MPW reseller of GF, a world leading specialty foundry.

We provide access to **GF's advanced and specialized FinFET, RF SOI, 22FDX™, SiGe, and Silicon Photonics platforms**. We also offer access to dedicated runs and prototyping volume wafer production in **GF technologies**.

12LP FinFET

Features	Applications
<ul style="list-style-type: none">Logic Voltages → Vnom: 0.8V, Vmax: 0.945V4 VTs: SLVT / LVT / RVT / HVTIO offering: 1.2 V, 1.35 V, 1.5 V and 1.8 V EG DevicesWell resistor, precision MOL resistor, MIM / MIM4 / APMOM / MOS / VNCAP capacitors, ESD, eFuse, VPNP, VNPN and Diodes, Inductors, Transmission lineInterlevel Low-K and Ultralow-K dielectricsPackaging options: C4 solder, Round or Oblong Copper Pillar Bump, Micro pillar Bump	<ul style="list-style-type: none">High-performance, power-efficient SoC applications such as CPU/ GPU and mobile processorsWired and wireless networkingRF/Analog: Wi-Fi, transceivers and high-speed networking

22 nm FDSOI - 22FDX

Features	Applications
<ul style="list-style-type: none">0.4 V to 0.8 V nominal core voltage1.2 V/1.5 V/1.8 V IO optionsFour core device Vt's (FBB, RBB & eLVT)RF BEOL/w ultra thick metal stacksAPMOM capacitor	<ul style="list-style-type: none">Integrated RF and analog designsLow-power digital circuitsmmWave technologies

45 nm RFSOI

Features	Applications
<ul style="list-style-type: none">1 V/1.5 V/1.8 V1P8M processNative/HVT/SVT/UVT FETsN+ silicide resistorVertical natural capacitorBEOL inductorsThin oxide Varactorft/fmax 290/410 GHz	<ul style="list-style-type: none">RF/mixed-signal designsHigh-speed digital circuits

The GlobalFoundries logo and 22FDX technology are trademarks or registered trademarks of GlobalFoundries Inc.

90 nm BiCMOS SiGe – 9HP

Features	Applications
<ul style="list-style-type: none">• 1.2 V/1.8 V/2.5 V/3.3 V• 1P10M process• Native/HVT FETs• f_t/f_{max} 310/370GHz• Twin_ or triple_well (NFET in isolated pwell) CMOS technology• MIM/Dual/High Q MIM capacitors• Series/Parallel spirals Inductors• PIN/Schottky Barrier diode	<ul style="list-style-type: none">• RF/mixed-signal designs• High-speed digital circuits• Low power circuits

130 nm SiGe BiCMOS – 8XP

Features	Applications
<ul style="list-style-type: none">• 2 V/2.5 V Core voltage• 5 V/3.3 V IO voltage• 5 metal base stack, with the option to 8 levels of metallization• High performance enhanced FET• f_t/f_{max} 250/340 GHz• MIM and Dual MIM• Regular V_t and Triple well FET options• Series/Parallel spirals Inductors• $\mu m/mm$ wave passive components• Thin/Thick dual gate oxide	<ul style="list-style-type: none">• Integrated RF and analog designs• High-speed digital circuits• mmWave technologies

45CLO and XFAB XT018 Coming Soon

Contact sales@cmc.ca for price options.



PiezoMUMPs is a piezoelectric-based MEMS process for sensors, energy harvesters, ultrasonic transducers, microphones, and self-contained microsystems for automotive, aerospace, healthcare and entertainment electronics markets.

PiezoMUMPs

Features	Potential Applications
<ul style="list-style-type: none">• SOI MEMS• 25um structure layer• Aluminum nitride piezoelectric layer	<ul style="list-style-type: none">• Energy harvesters• Ultrasonic transducers• Microphones

The **PolyMUMPs** technology is a triple polysilicon, single metal surface micromachining process with deposited oxide (PSG) as the sacrificial material, and silicon nitride for electrical isolation from the substrate. CMC also offers optional HF release and supercritical carbon dioxide drying.

PolyMUMPs

Features	Potential Applications
<ul style="list-style-type: none">• Surface MEMS• Three structure layers	<ul style="list-style-type: none">• Acoustics• Sensors and actuators• Micromirrors• Micro-assembly

Contact sales@cmc.ca for price options.

The **MEMS Integrated Design for Inertial Sensors (MIDIS™)** platform is designed to provide a standard process for manufacturing accelerometers and gyroscopes and integrating them into an Inertial Measurement Unit (IMU) for application areas such as consumer (mobile), automotive, aerospace and sports/health markets. With Teledyne DALSA, CMC offers a seamless path from MPW design confirmation to volume manufacturing.

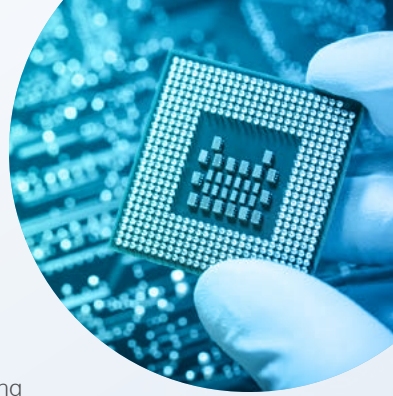
MIDIS

Features	Demonstrators
<ul style="list-style-type: none"> • Getter-free high-vacuum sealing allows resonator Q factors > 20,000 • Efficient wafer-level packaging minimizes overall die size • 1.5 μm feature size in a 30 μm thick membrane • Comb height control allows out-of-plane sensing • TSV allows compact design ready for co-packaging 	<ul style="list-style-type: none"> • Design IMICRE1: has 2 types of accelerometers i.e. X-Axis and Y-Axis accelerometers and 1 basic resonator. They are all low frequency devices and operate within 5KHz frequency range. • Design IMICRE2: has 3 types of accelerometers i.e. Z-Axis, X-Axis and Y-Axis accelerometers. They are also low frequency devices and simulation work is in progress for them.

Contact sales@cmc.ca for price options.



Packaging & Assembly



CMC delivers packaging services, backed by engineering support and consultation, providing researchers with physical components for testing and building prototypes.

THIS INCLUDES:

- ✓ Standard component wire bond packaging
- ✓ Single or multi-die assembly including flip-chip service
- ✓ Custom packaging & assembly services on a case-by-case basis
- ✓ Expert engineering support and consultation

PACKAGING SERVICES:

- ✓ DIP; CFP/CFQP; CPGA
- ✓ Custom packaging and assembly
- ✓ Single or multi-die (stacked die) assembly
- ✓ Photonic packaging in a 14-pin butterfly package
- ✓ Custom Si-Photonic packaging
- ✓ Wafer-level and die-level bumping
- ✓ Die on glass, die on board
- ✓ Dicing/sub-dicing

Visit www.CMC.ca/packaging

Contact sales@cmc.ca for packaging quotes.

Cadence Cloud Passport Program

Cadence access deployed on the cloud by CMC Microsystems to universities in North America. Provides secure access to existing Cadence software licenses with no university IT Support required.



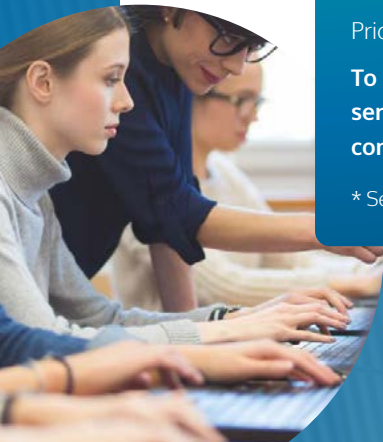
OFFERING INCLUDES:

- ✓ Delivery via CMC cloud design environment
- ✓ Deployed, maintained, and hosted by CMC with continuous software updates
- ✓ Design and development resources available on demand
- ✓ Available for use in classroom education or research environments
- ✓ Access to Cadence University Software program software, Rapid Adoption Kits (RAKs), and GPDs

Price: \$2,000 USD/year*

To learn more about accessing the cloud service with your existing Cadence license, contact sales@cmc.ca.

* Service fee does not include charges for cloud resources



CMC SponsorChip™

for Companies



The **CMC SponsorChip** program is an industrial sponsorship opportunity for companies to get technology insights and accelerate R&D, access exceptional tech talent, and support post-secondary research in Canada.

BENEFITS TO COMPANIES

ACCELERATE R&D

- ✓ Try out advanced microelectronics, silicon photonics, and MEMS technologies.
- ✓ Propose design challenges and establish collaborative R&D projects.
- ✓ Access CMC's global supply chain for semiconductor and photonics fabrication.

ACCESS TECH TALENT

- ✓ Tap into the expertise of CMC's network of more than 1000 professors and 4000 graduate students.
- ✓ Increase the visibility of your company, and recruit tech talent.
- ✓ Leverage expertise of CMC's engineering and scientific staff.

SUPPORT UNIVERSITY AND COLLEGE RESEARCH IN CANADA

- ✓ Professors benefit from low-cost access to tools and techniques that allow them, their students and research staff to test and publish new ideas.
- ✓ Graduate students and post-doctoral fellows benefit from knowledge gained in hot industrial topics, affordable chip design and fabrication, and exposure to possible future employers.

Under the **CMC SponsorChip** program companies choose a sponsorship option linked to their area of interest and CMC takes care of the rest.

CMC SPONSORCHIP OPTIONS

Purchase a CMC-brokered fabrication run
E.g., 12 nm CMOS

Support a CMC training workshop or webinar

Support a CMC Basecamp training event
E.g., FinFET design

Invite professors and grad students onto your company's shuttle run

Donate equipment, expertise, or IP blocks

Make an untargeted financial contribution

Manufacturing microsystems prototypes is one way to participate in CMC SponsorChip. Contact us to explore other options, for example: projects focussed on IoT and Edge AI platforms, design contests, events, and more.

www.CMC.ca/CMCSponsorChip

CMC takes care of the details!

- ✓ Connects sponsors with professors and graduate students.
- ✓ Runs cross-Canada design challenges.
- ✓ Manages logistics for multi-project wafer (MPW) fabrication runs.
- ✓ Provides CAD tools and expert advice to students and professors.
- ✓ Ensures contributions and equipment are well managed and used.

Contact sales@cmc.ca to discuss your interests and subscription options.

Platform Solutions

RISC-V

- ✓ CMC offers design platforms and support for realizing RISC-V prototypes on FPGAs or ASICs, provided as open-source through CMC's GitHub repositories. CMC also supports OpenHW Group CORE-V family of RISC-V cores. www.cmc.ca/risc-v

ELECTRONIC SENSOR PLATFORM (ESP)

- ✓ ESP is a platform for integrating a functional material with field-effect transistors. The resulting sensor converts trapped charges into a voltage signal. The platform is useful for the implementation of solid-state high-performance detectors. www.cmc.ca/ESP

SWIFTMOTE IOT CUSTOMIZABLE SENSOR PLATFORM

- ✓ The SwiftMote Sensor Platform is a Bluetooth wireless sensor mote. It's an open platform designed to be a proving ground for novel sensors and packaging research to showcase to investors. www.cmc.ca/swiftmote

BARVINN: A BARREL RISC-V NEURAL NETWORK ACCELERATOR

- ✓ BARVINN is a Barrel RISC-V Neural Network Accelerator whose main purpose is to fill the need for arbitrary precision neural network acceleration. www.cmc.ca/barvinn

COMING SOON

- ✓ Photonics toolkit
- ✓ Silicon interposers
- ✓ Protopack
- ✓ 64 bit RISC-V vector scalar processor
- ✓ Si photonics + laser integration



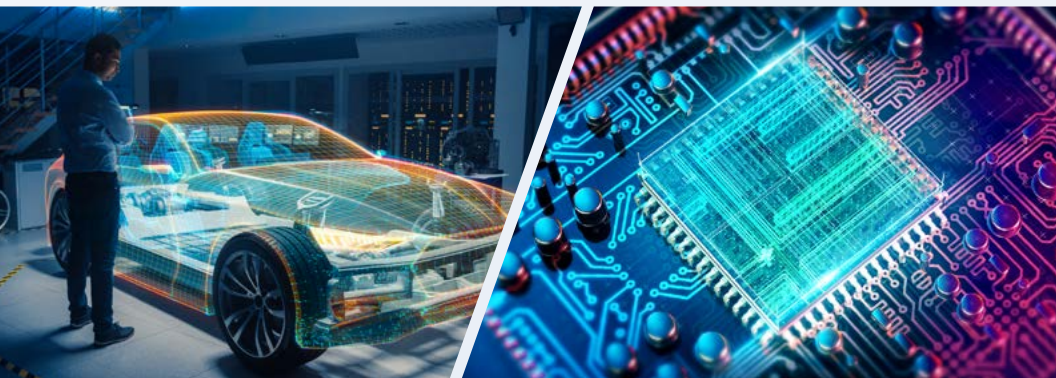
Contract R&D



FEATURES

- ✓ Support and expertise for advanced technologies
- ✓ Assistance on enabling startups and commercialization of micro-nano technology
- ✓ Brokered access to global sources of commercial chip manufacturing
- ✓ Technical documentation, literature search, report creation
- ✓ Project planning, cost estimation, schedule development
- ✓ Ability to organize academic/industrial research consortia through our vast national and international networks

Contact sales@cmc.ca for details on more options.





CMC Microsystems is a not-for-profit organization accelerating research and innovation.

Founded in 1984, CMC lowers barriers to technology adoption by creating and sharing platform technologies, including access to state-of-the-art design, manufacturing, and testing capabilities for advanced technologies. CMC also manages Canada's National Design Network® (CNDN) – a Major Science Initiative involving over 10,000 academic participants and 1,000 companies developing innovations in microsystems and nanotechnology.

Through its extensive global supply chain and partner network, CMC extends the reach of made-in-Canada technologies by offering world-wide access. CMC is part of the global MNT services organizations:



Contact us to discuss your needs or to leverage our network of expertise in Canada. If we don't have it, there's a good chance one of our partners does, contact us at sales@cmc.ca.



CMC Microsystems® Products and Services Catalogue

sales@cmc.ca

www.CMC.ca



© 2022 and Reg. TM – CMC Microsystems. All rights reserved.

IC-2202

CMC Microsystems, the CMC Microsystems logo, CMC SponsorChip, CADpass, Canada's National Design Network and Réseau national de conception du Canada are trademarks or registered trademarks of Canadian Microelectronics Corporation / Société canadienne de micro-électronique operating as CMC Microsystems.

All other product or company names are trademarks or registered trademarks of their owners.