CANADA’S LEADING DEVELOPER OF INDUSTRIAL OPTICS AND PHOTONICS SOLUTIONS
• Who is INO
• Uncooled Microbolometers
• Microbolometer-based Cameras
• Custom Packaging and Flight Heritage
• Future Developments
Key Facts*

- Founded in 1988
- **199** employees
- **$34.6M** operating
- ISO 9001:2008
- ISO 13485:2003

**Locations**
- Quebec City (HQ)
- Hamilton ON
- Calgary AB

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**Statistics**

- **6,000** R&D contracts
- **256** Patents (81 pending)
- **69** Technology transfers
- **32** Spin-offs

*As of June 5th, 2017*
Uncooled Microbolometer Technology

- Fabricated using MEMS surface micromachining techniques
- Based on vanadium oxide thin film thermistor technology

52 µm pitch pixel array
25 µm pitch pixel FPA
Vacuum packaging
Broadband Absorber

- Gold black is a very good absorber film suitable for integration with fast MEMS thermal sensors
- With financial support from the Canadian Space Agency, INO has established a new gold black facility including deposition and laser trimming stations
- Gold black layer can be tailored between 25 and 40 µm of gold black
- Laser trimming of gold black to singulate and preserve the electrical and thermal isolation of each pixel
- Integration with microbolometer detectors is performed on a regular basis
  - Measured pixel level absorption is above 90 % from visible to far infrared
  - Detector thermal capacity increased is less than 50 %
IR and THz Camera Cores

IR Camera Cores
- Mimic II V2
  - 160x120 Digital Output
- IRXCORE
  - 640x480 Camera Link Output
- IRXCAM
  - 640x480, 160x120 Onboard Processing
  - GigE Output
- IRXCAM-1024
  - 1024x768
- IRXCAM-384
  - 384x288
- μXCAM-384
  - 288x384

High Resolution Camera Cores with Microscan
- HRXCAM-1280
  - Microscan Optics 1280x960
- HRXCAM-2048
  - Microscan Optics 2048x1536
- HRXCAM-16K
  - Microscan Optics 16384x12288

Terahertz Camera Cores
- MIMICII-THZ-160
  - 160x120
- IRXCM-THz-160
  - 160x120
- IRXCAM-THz-384
  - 384x288
- μXCAM-THz-384
  - 288x384
Throughout the years, INO has often worked with space agencies to package bolometers:

- Several missions and applications
- Various packaging requirements
Future Developments – Multispectral imaging

• Butcher Block filter located in front of the focal plane array

4x1 butcher block on Gel-Pak

508 µm

4 x 572 µm
Future Developments – Hyperspectral imaging

**Modular Benchtop MWIR-LWIR imaging spectrometer**

- Based on Fabry-Pérot Interferometer (FPI) and INO μXcam-384 camera with goldblack-coated microbolometers
- Adaptable to a wide range of possible IR wavelengths depending on chosen Fabry-Perot interferometer

**Preliminary tests in LWIR band**

Visible image of a beryl-topaz sample

Radiance spectra of 9 center pixels

- Sample size: 61mm x 78.5mm x 101mm
Thank you.

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