



Research Collaboration and Technology  
Licensing Opportunity: Robust, compact,  
Ultraspectral Imaging System

Background: Spectral images contain both spectral and spatial information about the specimen and are a powerful tool for extracting this information from biological, geographical, mineral and chemical subject matter. Ultraspectral imagers are useful in applications where an extremely high spectral resolution is required in conjunction with spatial imaging. To date, the photonics industry has had to make tradeoffs between spatial and spectral resolution when trying to achieve instrument compactness.

Solution: Researchers at Montana State University are developing a highly miniaturized ultraspectral imager based on tunable (spatial and spectral) microcavities.

Benefits:

- High spatial and spectral resolution – spatial resolution scales to ~1 megapixel, spectral resolution  $d\lambda$  50pm.
- Reduced manufacturing costs – no MEM's technology, no mechanical moving parts
- Snap shot system – non-scanning approach for imaging capture
- Very high data acquisition rate
- Ultra-compact housing (10mm x 10mm x 5mm, non-optimized)

Targeted industries:

1. Medical diagnostics – i.e. skin cancer screening
2. Chemical sensing – pharmaceutical and environmental applications
3. Food quality assessment and safety control
4. Industrial and agricultural sorting, recycling
5. Identification of trace minerals (drill-core mineral mapping)
6. Quality control in integrated circuit manufacturing
7. Satellite imaging
8. Replacement for optical spectrum analyzers and diffraction element based spectrometers

Supporting publications:

1. A tunable microcavity, Journal of Applied Physics 110, 053107 (2011)  
[http://publicationslist.org/data/r.j.warburton/ref-481/Barbour\\_JAPL\\_2011.pdf](http://publicationslist.org/data/r.j.warburton/ref-481/Barbour_JAPL_2011.pdf)

Researchers:

Zeb Barber, Ph.D. <http://www.spectrum.montana.edu/barber.html>

Russell Barbour, Ph.D., Postdoctoral Fellow <http://www.spectrum.montana.edu/russell.html>

Contact for Inquiries:

Daniel Juliano, Technology Transfer Office, 406-994-7483, [daniel.juliano@montana.edu](mailto:daniel.juliano@montana.edu)