Broadband and Ultrahigh Resolution Spectrometer Based on a Multimode Waveguide
Technology #16610

Applications
This invention is used in analytical chemistry, biochemical sensing, material analysis, optical communication, and medical applications.

Problem Addressed
Developing miniature spectrometers require sacrificing the high spectral resolution and broad operating range possible in large grating spectrometers. Therefore, there is a need to develop compact spectrometers with high resolution and broad operating range.

Technology
The invention is a monolithic, compact spectrometer based on multimode interference (MMI) and can simultaneously achieve high resolving power and bandwidth in a simple-to-couple and compact device. It matches the performance of large grating spectrometers using modal interference in a multimode waveguide with an area of a few square millimeters or less. These kinds of MMI spectrometers could be used in applications requiring broadband operation and high-resolution spectroscopic analysis.

Advantages
- Wider operating range than other millimeter scale spectrometers
- It offers both high resolving power and fractional bandwidth within a compact device
- Comparative performance with large grating spectrometers

Categories For This Invention:
- Photonics
- Sensors (Photonics)
- Spectroscopy (Sensors)
- Life Sciences
- Chemicals
- Biochemicals
- Instrumentation
- Spectroscopy (Instrumentation)

Intellectual Property:
Methods and apparatus for spectrometry
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Publications:
High-resolution Optical Spectroscopy Using Multimode Interference in a Compact Tapered Fibre
Nature Communications
July 23, 2015

External Links:
Quantum Photonics Laboratory
http://www.rle.mit.edu/qp/

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