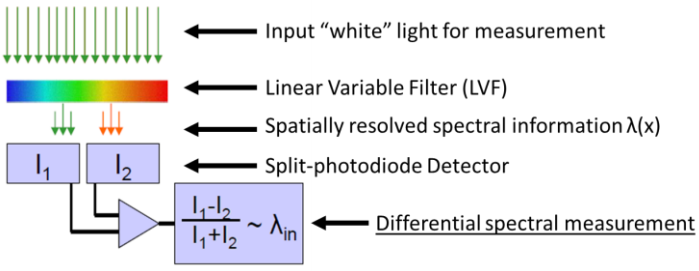
Overview

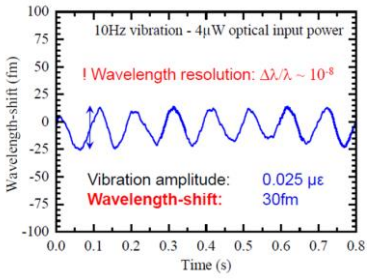
Open Photonics Inc (OPI) has partnered with PARC, a Xerox company, to commercialize a low cost optical interrogator. The Wavelength Shift Detection (WSD) technique provides a compact, low-cost and scalable system capable of measuring the resonant shift of a target (e.g. Fiber Bragg Grating sensor) with resolution down to 30fm and up to kHz speeds.[1,2,3,4] FBG sensors have quickly moved away from novelty in various material system deployments and is ripe for a disruptive breakthrough in interrogation capability like WSD.

OPI is looking to accelerate the market adoption of WSD in an array of application areas described below and we encourage you to approach us with these and other market opportunities.

How it works

By mounting a Linear Variable Filter (LVF) to a split-photodiode, spectral input information is translated to a single, differential output signal for monitoring spectral changes over time. This concept is well suited for measuring the shift of a resonant peak (e.g. FBG sensor) or directly sensing well-controlled chemical reactions.[5,6,7,8,9] While detailed spectral information on the reflected spectrum is sacrificed, WSD offers extremely well resolved data on centroid and the motion of spectral features which is key to the applications discussed below.

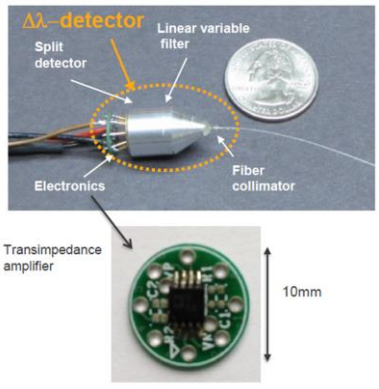




Because of the elegance of this design, it can be readily adapted for any region of the spectrum in which adequate semiconductor detectors exist. Further, the spectral band under analysis can also be tuned.

State of development

WSD hardware has been proven in laboratory settings and is now transitioning to various commercial applications including those highlighted below. OPI is interested in identifying partners with current market needs that can provide the pull necessary to bring this disruptive capability to market. While a current focus on the interrogation of FBG sensors exists, OPI is also excited about the potential use of this technique for the monitoring of controlled chemical and gaseous reactions.



Applications

Battery Management

The inside of any chemical energy storage medium is a hazardous and delicate environment. Not surprisingly, therefore, optical monitoring methods have been looked to extensively to replace electronic methods. Interrogation of FBG sensors embedded within the active chemistry of a battery yields information about that battery's state of charge as well as providing advanced warning of failure modes.[10]

Optical Thermocouples

The thermocouple market is enormous in spite of the low cost of products. There are, however niche environments that require either chemically inert, electrically safe, or high temperature thermal monitoring which cannot be met effectively by incumbent electronic technologies. The barrier to the adoption of optical techniques has been, as mentioned above, is the availability of low-cost and scalable interrogators. The delivery of WSD interrogators to this market is likely to be the tipping point for optical transition for these still high volume niche applications.

Industrial Process and Infrastructure

Monitoring the health of structures and capital equipment has at various times worked to adopt optical technologies, but due to the complexity and cost of commercial interrogation systems have failed to become ubiquitous. These industries are slow to adopt change but represent high-volume opportunities that align strongly with WSD enabled technology.

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[10] Saha, Cuong, Goebel, "Optimizing battery life for Electric UAVs using a Bayesian framework," IEEE Aerospace Conference 2012