Solid State Fourier Transform Spectrometer

Category: Sensors & Measuring techniques

Ref: 1410

Introduction:
Spectrometers analyse the interaction of light with solids, liquids or gases to give information about their chemical composition. A new generation of spectrometers are being developed which are compact, lightweight and robust, and can be configured to work in the ultraviolet, visible or infrared spectral regions. They are based on a novel, static, and stable optical configuration, making them well suited for use in hostile, industrial environments.

Innovative Aspects:
No moving parts making it cheaper and more robust than conventional Fourier transform spectrometers. The configuration is versatile and can be configured to suit various specific applications and requirements (for example, operating in different spectral regions, or at different measurement speeds).

Application Areas:
- Process monitoring
  - Enables companies to reduce processing costs, improve product quality, minimise waste, ensure product uniformity, and comply with regulatory requirements.
- Laboratory based R&D
  - Compatible with a range of sample-interfaces, provides fast and reliable measurements, and makes infrared spectroscopy readily-available to laboratory users.
- Remote sensing
  - Un-manned aerial vehicles can be used to image and map the geological and agricultural characteristics of the ground below, or to look at the composition of the atmospheric gases surrounding it.
- Emissions monitoring
  - Incorporated into analyser systems for monitoring gaseous emissions from industrial chimney-stacks. Enables industries to adhere to environmental regulations.

An early prototype instrument operating in the UV-Visible spectral region

Technology description downloaded from www.technology-forum.com
• On-site forensic analysis.
• On-site analysis of chemical and biological security threats.

Description:
A compact and robust Fourier-transform spectrometer based on a unique configuration of common-path interferometer that uses no moving parts.

• Simple, static optical configuration
  o Robust to mechanical shocks and vibrations. Low maintenance requirements.

• Minimised size and mass
  o Portable with low power consumption.

• High speed data acquisition (limited only by the frame rate of the detector array)
  o Accurate and capable of monitoring dynamic chemical processes in real time.

• Imaging capability
  o A 2D image can be constructed by scanning the spectrometer over the target scene.

• Wide spectral range
  o Configurable to operate in any spectral region, from ultraviolet to infra-red.

Space Origin:
The spectrometer design evolved from research into novel designs of instrumentation for space-based gas-sensing applications at the Rutherford Appleton Laboratory (RAL). The original aim was to develop an instrument suitable for deployment on space-borne satellites, UAVs and radiosondes, that was capable of detecting and identifying pollutant gases in planetary atmospheres, both in-situ and remotely.

Cooperation:
Licence and sales opportunities are sought.