



Cover image

Advances in spectroscopy broaden the remit of this technology and spur further developments.

EDITORS: NADYA ANSCOMBE,
OLIVER GRAYDON

PRODUCTION EDITOR: CHRIS GILLOCH

COPY EDITOR: ANNA DEMMING

ART EDITOR: TOM WILSON

naturephoton@nature.com

Quality check

The traditional way of performing quality control is to make a product and then test it. Today, thanks to advances in spectroscopy, quality control and process analysis can be carried out during manufacture, giving information in real-time. If the analysis reveals a problem or an unacceptable condition, the operator can halt or alter the manufacturing process to mitigate or eliminate the problem. This, according to two independent research analyst companies, is one of the fastest growing areas of spectroscopy (page 544). Once used only in laboratories, spectrometers are now finding their way into manufacturing plants and making a real difference to a company's profitability and efficiency.

And it is optical technology such as infrared, near-infrared and Fourier-transform infrared spectroscopy that is leading the way. The spectroscopy technologies are growing because of market demand, but it is improved analytical instrument design that has enabled this growth. Advances include rugged optics, flexible fibre-optic sampling probes and solid-state detectors.

Laser-induced breakdown spectroscopy, for example, is now suitable for field deployment thanks to advances in laser technology and system design (page 537). And terahertz spectroscopy is also blossoming because of the availability of compact femtosecond sources and semiconductor detectors (page 541).

A driving force behind the development of these new technologies is the defence industry. But the defence industry is not the only industry to benefit from advances in spectroscopy. Molecular spectroscopy with its diversified end-user applications also has a growing customer base in the biotech, life sciences, pharmacology, agriculture and food and beverage industries. Government labs and academic sectors are also embracing the technology and techniques, but represent a smaller market. It seems no matter what industry you are in, for every product, no matter what it is, there is a type of spectroscopy that can be used to analyse it.

RESEARCH HIGHLIGHTS

535 A low-cost terahertz spectrometer, a high-performance mid-infrared source, and more

INDUSTRY PERSPECTIVE

537 **Laser-induced breakdown spectroscopy:** Sparking new applications
Bob Kearton and Yvette Mattley

541 **Terahertz spectroscopy:** Signatures and fingerprints
Louise Ho, Michael Pepper and Philip Taday

BUSINESS NEWS

544 Markets profit from wide-ranging applications

PRODUCT HIGHLIGHTS

545 Noise reduction, integrated spectrometry and microscopy apparatus, and more

INTERVIEW

548 Attosecond analysis
Interview with Ferenc Krausz

nature
photonics