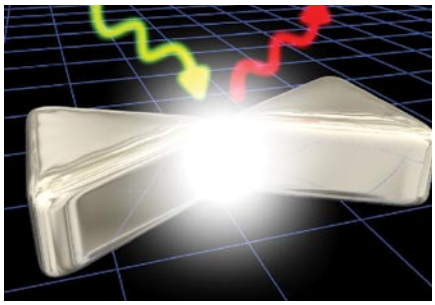
SERS Nanoprobes

Surface Enhanced Raman Spectroscopy

Overview

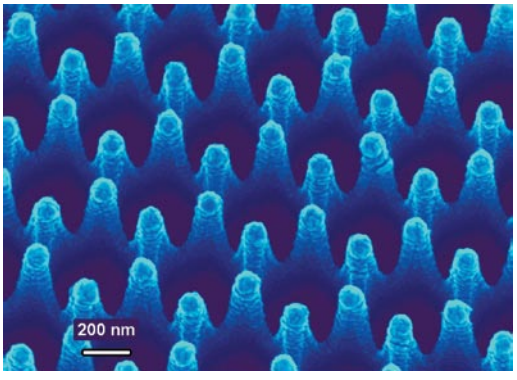
Swinburne University of Technology (SUT) in collaboration with BioPharmica Limited [ASX:BPH] is working to develop and commercialise the SERS Nanoprobe, a device that allows the microscopic tip of an optical fibre to be used in biosensing. This sensor can be incorporated into portable field instruments with potential in medical, military and environmental applications.

Technology and Competitive Advantage

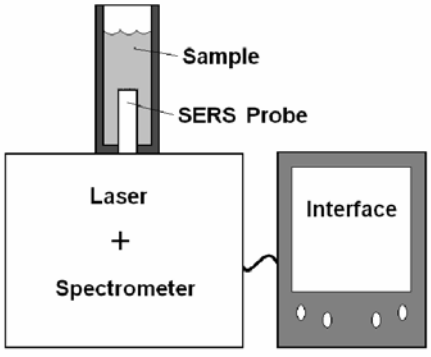


SERS (Surface Enhanced Raman Spectroscopy) is well known as a powerful, sensitive and versatile technique for detecting chemicals at trace levels in complex mixtures. Raman spectroscopy utilises an intense laser light source to illuminate a sample in which a small portion of the light is shifted in a characteristic manner. This provides a spectrum (a signature), which can be compared against spectral libraries to provide chemical identification. No sample preparation is required, and the Raman signal is unaffected by glass containers or water. SERS exploits an effect whereby chemicals in close proximity to a roughened metal surface (usually gold or silver) have a greatly increased Raman response. This significantly increased sensitivity opens an opportunity for the development of new instrumentation.

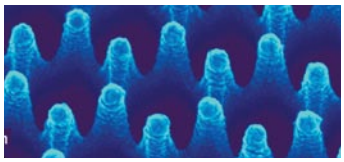
The major challenge is to apply the power and sensitivity of SERS in the field under everyday conditions. What is currently lacking is the limited availability of SERS probes, disposable elements that have been selectively coated to give a SERS response. Dr Stoddart's team at the Centre for Atoms Optics and Ultrafast Spectroscopy at SUT has solved this problem by inventing a novel nanostructure optical fibre technology called honeycomb optical fibre (HOF). These fibres represent a breakthrough in the area of SERS since HOF can form the core element of disposable SERS probes with enhanced sensitivity. Dr Stoddard's proprietary technology makes it possible to manufacture affordable SERS probes for compact, field-portable spectrometers.



Honeycomb Optical Fibre (HOF).



Schematic Dlagram of a portable SERS analyser.



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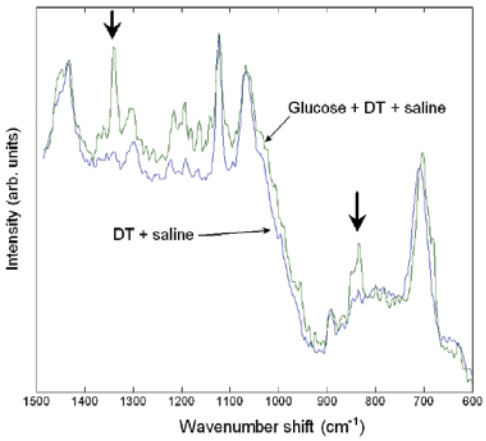
Technology Applications

Dr Stoddart and his team are working on the development of instrumentation for applications in the fields of medical diagnostics as well as military and environmental monitoring.

Glucose Monitoring

Recent research in the United States has established that SERS can be used to perform in vivo, time-dependent monitoring of glucose levels. Dr Stoddart's team is developing a prototype portable, low-cost SERS spectrometer for use in a continuous, in-vivo glucose biosensor. The device would allow the glucose levels of diabetes patients to be more precisely controlled, resulting in an improved long-term health outlook.



SERS spectra of decanethiol (DT) with saline (blue) and of DT exposed to a 500 mg/dl solution of glucose in saline (green). The heavy arrows show two of the major glucose SERS peaks.

Water Monitoring

SUT and BioPharmica are working with the laser systems manufacturer OptoTech Pty Limited and Nanotechnology Victoria Limited to develop a portable high-sensitivity device for rapid detection of contaminants in water. The device is expected to be used for environmental monitoring, analysis of agricultural and aquaculture fluids and in the food process industry.

Opportunity

SUT and BioPharmica are seeking companies and institutions interested in co-development, collaboration or licensing. A good fit would be companies with device manufacturing capabilities that seek to incorporate the novel proprietary SERS probes into sensor devices. Interested companies may be those who are looking to increase the capabilities of their existing devices or devices in development since the SERS technology can be used to increase sensitivity and detect a wider range of agents.

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