measure a specific molecule at low concentration, either in urban or office air. Measuring the quality of urban air is particularly important since The Air Quality (England) Regulations came into force on 6 April 2000. The regulations state that any area with a population greater than 250,000 people must meet tough air quality objectives and develop strategies to combat air pollution.

The laser absorption technique uses what are known as resonant cavities to measure pollutants. The laser light enters a cavity with two mirrors that bounce the light around. By placing the mirrors at an optimal position, the light gets trapped in the cavity for lots of bounces before a little bit escapes and is measured. The path length of the light is the distance the light travels altogether in the cavity and the longer the path length, the more light can be absorbed and measured. This small device is equivalent to having a laser at a point about 1km away from the detector which makes it invaluable for measuring gases in confined spaces.

Professor Gus Hancock’s group at the University of Oxford is working on new strategies to simplify this technique and reduce its cost. At present it is possible to achieve very high sensitivity in the lab, but only with an expensive set-up that wouldn’t survive industrial style handling needed for outdoor measurements. A system is now being prototyped for measuring formaldehyde which potentially causes asthma attacks.

Just mapping these pollutants in each city is a major undertaking, and measuring certain molecules with high enough resolution requires expensive analytical equipment. Thankfully, the recent advances in laser absorption techniques are enabling researchers like Hancock’s group to measure indoor air quality and urban pollution, said Saffell.

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Source: Alphagalileo

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**Identifying low-abundance proteins**

BD Biosciences and Thermo Finnigan have developed an innovative technique for isolating specific cell types in complex biological samples and then identifying low-abundance proteins from those cells. In brief, the technique uses BD Biosciences' fluorescence activated cell sorting (FACS) to separate a specific cell population from a larger cell sample. Proteins from the isolated, purified sample are then identified by introducing them into an ion-trap mass spectrometer.

The FACS technology differs from other cell isolation methods because it can sort out samples of sufficient size to work effectively with mass spectrometry. Methods commonly used to isolate specific cell subsets for proteomics studies, such as laser capture microdissection, produce only a few thousand cells per sample. Mass spectrometry analysis of cellular proteomes normally requires several million cells per sample.

The type of sample used to demonstrate the technique was human blood from normal volunteers. The specific proteins of interest were expressed from two different types of T-cells (CD4 and CD8), which are major components of the body’s immune system.

The FACS technology uses cell surface markers, DNA content, biochemistry or morphology to sort a cell subpopulation from a complex sample. Once the cells of interest are isolated, the proteins from the cells are digested into peptides and identified using an ion-trap mass spectrometer and Thermo Finnigan's proprietary protein identification software.

The technique was presented at the Fifth International Symposium on Mass Spectrometry in the Health and Life Sciences, August 26-30, San Francisco, CA.

Source: Newswise

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**‘Imprinted’ gels**

Scientists at Purdue University are creating a biological sensor for glucose in research that ultimately may help to design intelligent drug delivery devices that could be implanted in the body to administer medications such as insulin.

The researchers formed a mesh-like biomimetic gel containing glucose molecules and then used a slightly acidic chemical to remove the glucose, leaving behind spaces where the glucose used to be. If placed in a liquid such as blood, glucose in the liquid diffuses into the gel
and binds to the empty spaces. The gel is said to be imprinted for glucose molecules. Similar materials might be used in future medical devices to sense the presence of glucose, perhaps signaling an action to release insulin or other medications for diabetics, said chemical engineering doctoral student Mark Byrne who presented the work during the recent ACS national meeting in Chicago.

Nicholas A. Peppas, Purdue’s Showalter Distinguished Professor of Chemical and Biomedical Engineering, and Kinam Park, a professor of pharmaceuticals and biomedical engineering are supervising his research.

There is a lot of interest in glucose sensing for diabetes research, Byrne said. And that has been the main focus of this work. However, we are also working on systems that bind other molecules that are important for the treatment of other conditions. The approach attempts to mimic how some molecules attach to binding sites on other molecules. The biomimetic gel contains numerous artificial binding sites for glucose.

Artificial sensing mechanisms can potentially be incorporated into medical devices implanted inside the body. The sensing mechanism would be part of a meshwork containing medications inside numerous microscopic cavities. Sensing glucose in the blood would automatically trigger the meshwork to expand, opening pores and releasing insulin or a medication that would enable the body to more efficiently absorb insulin.

An important aspect of the Purdue research is that the gel has been made with a non-toxic solvent and in water, meaning it would be compatible with the human body. The gel is created by ultraviolet light, which causes molecules surrounding the glucose to form the binding sites. Then, the glucose is removed with an acidic chemical, leaving the empty, synthetic binding sites.

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Source: Newswise