



RESEARCHERS WANT TO SIMPLIFY THE URINE ANALYSIS PROCESS

You have probably tried at least once to hand in a urine sample to find out something about your health situation. Hospitals and clinical laboratories receive thousands of urine samples for advanced testing each year. Most of these turn out to be negative samples with no need for testing in the first place.

Imagine if your own doctor could have identified the negatives before sending them to the hospital. This could potentially save the labs for a big amount of resources and many hours of work, and more importantly - your doctor could rule out a whole bunch of different causes for your illness within minutes.

This is just one of the potential uses of a new technology currently being developed at the Department of Engineering at Aarhus University.

A more efficient analysis process

The technology is able to measure concentrations of micro particles in fluids. A micro particle can basically be just about anything within the size range from 0.1 to 100 micrometers. For comparison the width of a hair is about 10 micrometers and a typical bacteria found in urine infections, *E. coli*, is about 1 micrometer. Therefore this new technology is suitable for detecting bacteria.

Normally a doctor would send in a urine sample if he suspects it to contain an unusually high number of bacteria. The laboratory would then let the potential bacteria grow in a petri dish with a special culture medium for up to three days.

First hereafter would they be able to say anything about the bacteria in the sample. If there are no bacteria present in the petri dish after three days, the sample would be categorized



AARHUS
UNIVERSITY

DEPARTMENT OF ENGINEERING

as a negative and the doctor would have to look elsewhere for the illness cause of his patient.

In other words - three days have been wasted in the search for the cause. Not to mention the 500 kr. it costs to perform the analysis.

The hope is that the production costs of a device with the new technology could be so low that practically all doctors could have it available at their own practice. In that way it would be possible to only send in the samples that actually contain a significant amount of bacteria.

Like snowflakes caught in the headlights

The technology uses laser light to detect the particles. The fluid with particles is led through a light beam of high intensity. When the particles are hit by the light they will look like they are shining themselves.

The concept is quite similar to a well-known scenario: driving a car during a snowy night. The headlights of the car make the otherwise invisible snowflakes visible within the light beam. When we sit in the car it is our eyes that detect the shining snowflakes. With the micro particles a small light sensor serves as the detector.

Apart from having a potentially low price tag, what really makes this technology stand out from existing technologies is the shape of the light beam. The light is shaped in a very specific pattern. This makes it possible for the researchers to extract more information from the measurement, e.g. the speed of the particle movement through the light beam. It also makes sure that it is possible to measure many

particles at the same time. In that way high particle concentrations can be detected.

Many possible uses

The principle behind the technology has already been proved to work so the researchers are on the lookout for different applications at the moment. Besides from the urine analysis, many ideas are being considered like measuring motility (degree of movement) of sperm cells, concentration of airborne particles, and cleanliness of water.

Many processes in the medical, chemical, and food processing industries also require particle monitoring. The solutions already on the market are often quite expensive. This is a problem that the researchers hope to solve in the near future.

Contact:

PhD student Casper Clausen,
casperc@eng.au.dk