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Singapore: Australian scientists at the University of New South Wales (UNSW) and University of Sydney have developed a super-fast sensor that can detect the tiniest traces of contaminants or bacteria. The new biosensor has the potential to be used in the detection of disease through blood testing, as well as in fields such as environmental analysis.

The study, which was published in the journal Angewandte Chemie, showed that the biosensor was able to detect the antibiotic, enrofloxacin, at levels as-low-as one nanogram in one litre of milk within 40 minutes. The research team is hoping to refine the technology to be able to detect rare cells in blood at a level of one cell in 10 million.

Presently the biochemiresistor can detect only a single molecule, but Prof Gooding believes that improvements on the level of sensitivity are achievable. The biochemiresistor uses gold-coated magnetic particles about 150 nanometres in size that are coated with antibodies to the compound, or analyte, that needs to be detected.

The nanoparticles are dispersed through the liquid to be analysed and if the analyte is present some of the antibodies detach from the nanoparticles. Using a magnet, the nanoparticles are then assembled back together into a film between two electrodes and the electrical resistance is measured.

Senior author professor Justin Gooding, School of Chemistry, UNSW, and the Australian Centre for Nanomedicine, said that, "When you have a sensor you want the thing you want to detect to come up to the surface, but it can take time. For example if you are trying to find a microbe in water it may take three weeks to find it. So we don't make the analyte (item of interest) find the sensor, we make the sensor find the analtye. We break the sensor into very small pieces, send it out and then use a magnetic field to bring it back."