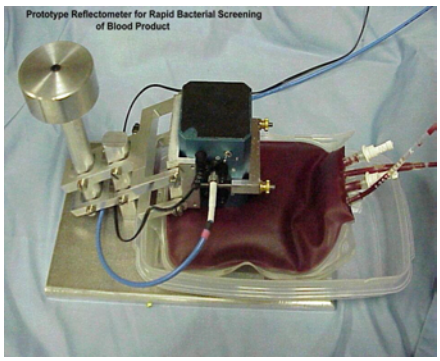
Prototypes
by Oleg Senkov

Tested – Bacteria Free

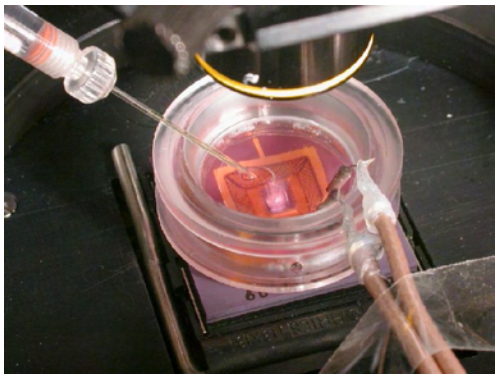


Lab prototype reflectometer

Transfusion-acquired bacterial infections, including sepsis, are a major cause of long-lasting diseases and mortality in recipients of blood components. Donated blood may be contaminated with different bacteria either throughout many stages of its preparation or due to already contaminated sources. In spite of this, no routine rapid-screening tests for blood cell samples exist in transfusion medicine today.

To solve this problem, researchers at Physical Science Inc. (PSI) in Andover, MA, in collaboration with the Dartmouth Hitchcock Medical Center and the University of Minnesota have created a prototype of the first portable device which is able to detect rapidly the presence of dangerous levels of fatal bacteria contaminations in donated blood packages. It is known that contaminated blood units darken in color due to bacterially-induced hemolysis and deoxygenation, but this color change is visually undetectable until late in storage, is difficult to recognize, and has a high false-positive rate. The PSI's designed reflectometer using a special spectral-scanning method can accurately identify the bacterially-induced color change and give the alarm "don't use". This method provides a sensitive, quantifiable, and non-invasive testing criterion that could greatly reduce contamination risk of donated blood samples proposing simple and reliable test in everyday hospital practice.

Neurochip from Infineon



Researchers at Infineon Technologies from Munich and Max Planck Institute (MPI) from Martinsried (Germany) have successfully connected a newly developed biosensor chip with living nerve cells and read electrical signals produced by neurons of snail brains. This chip has dimensions 5 x 6 millimeters including the circuitry required to amplify, process neuronal signals and transmit the data into a computer system. It is based on a standard CMOS technology. Neuro chip integrates 128 x 128 sensors (electrodes) in a microarray covering just 1 square millimeter. The sensor density of the neurochip is about 300 times greater then today's common methods for recording neuronal activity using glass substrates. Because the typical size of neurons is between the range 10-50 micrometers, only high-density sensors, like the Infineon's neurochip, are able to establish connections almost with all neurons in a sample. Every second, the neurochip can record more then 2,000 single values for each of its 16,384 sensors; it is about 32 million information bytes per second.

"Our long-lasting basic research on neuron-semiconductor interfaces now sees a high-tech chip, is like a dream coming true. Infineon's development of cutting edge microelectronics may be a pre-condition for unheard of applications in the field of biomedicine, biotechnology and brain research," say Professor Peter Fromherz - a leader of the MPI research team.

Lab on a chip

Sandia National Laboratories, Livermore, Calif., has developed a series of compact, hand-held detection systems that place the capability of a fully functional chemistry laboratory, which is MicroChemLab system. There are two types of this system: **µChemLab™ BD** (Bio-Detection) designed for the protein liquid-phase discrimination to detect and identify biotoxins, viruses and bacterial agents. It has already been successfully tested to detect 7 different forms of ricin – biotoxins, and recognize two staphylococcal enterotoxins. The second generation prototype called “Gen II” demonstrates now in the lab testing nanomolar sensitivities and 10-minute analysis times. **µChemLab™ CD** (Chemical Detection). Two gas-phase systems, one hand-held and one autonomous, can be used for the detection of chemical warfare agents and a selection of toxic industrial chemicals, explosives, and organic solvents.