

FLOW CYTOMETRY BRINGS ANALYSIS METHOD TO FLOW

Problem – Challenge

The bacteriological quality of (drinking) water is generally still evaluated using a method that is over 100 years old, namely cultivating bacteria on plates containing a nutrient medium and counting the bacterial colonies. Despite its ubiquitous use, this method is rather time consuming. It takes approximately 3 days to detect microbiological contamination of (drinking) water. The detection of additional pathogens, such as Legionella, can easily take several days to weeks. A further disadvantage of culture methods lies in the fact that only a minor fraction of microorganisms found in environmental samples (0.1-1%) grow in culture media and can therefore be detected. Over the past ten years however, flow cytometry (FCM) has become established as a modern, rapid and more complete method of microbiological measurement – largely due to research undertaken at Eawag. Originally used in medical routine analysis, Flow Cytometry is now finding its way into the quality control of drinking water as a promising alternative to existing methods.

Solution

Thanks to automated flow cytometry, microbiological dynamics can now be tracked promptly and in detail. Instead of placing each individual sample into the flow cytometer by hand, a unit coupled to the apparatus now does everything automatically, from sampling to sample preparation by staining the DNA/RNA, through to sterilisation of the cytometer. The fully-automated measuring system may be installed directly in-situ, such as at a water source or a water treatment plant. From there it transmits temporally high-resolution data sets of the bacterial concentrations over a period of several months, sampling and transmitting tens of thousands measurements. Out of the initial research two inventions have been filed for patent. FCM has been tested in both natural and technical systems within the context of a doctoral thesis and in a regional project with the Canton Basel Landschaft. Moreover, the former Ph.D, Dr. Michael Besmer, is now CEO of onCyt Microbiology AG, a spin-off of Eawag.

