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MONITORING OF BIOFILM DEVELOPMENT IN INDUSTRIAL WATER CIRCUITS BY AN ONLINE-SENSOR-SYSTEM

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ABSTRACT

Biofilms as a community of bacteria, algae and funghi play an important role in industrial processes. In most cases the presence of biofilms is unwanted. To protect equipment against aggregation and accumulation of biomass, biocides and dispergation agents are added to process and cooling waters. But there is still no robust and reliable method for controlling the success of the application of antimicrobial agents. Furthermore, a rapid real-time method for monitoring of microbial adhesion is beneficial for the manufactors of sensitive products that can influence human health, especially in food industry.

A new sensor system for online-detection of microbial biofilms in industrial water circuits is presented. The system consists of a monitoring device and an electrical amplification circuit. First test series with white water from paper industry showed a clear signal response of the sensor due to microbial growth and detachment of biofilms in laboratory reactors (figure 1). The increasing signal at the beginning of the detachment experiment can be related to the development of bubbles caused by the application of Hydrogene Peroxide. After detachment, there is still some biomass attached to the sensor surface. The output signal of the device is proportional to the thickness of the biofilm layer. The monitor can be used in nearly every equipment where fouling may occur. Because of its thermodynamic measurement principle the measurement is not affected by changes in turbidity of the aqueous medium. In contrast to other existing monitoring devices the sensor can be directly placed in tubes, channels and reservoirs, no bypass is necessary.

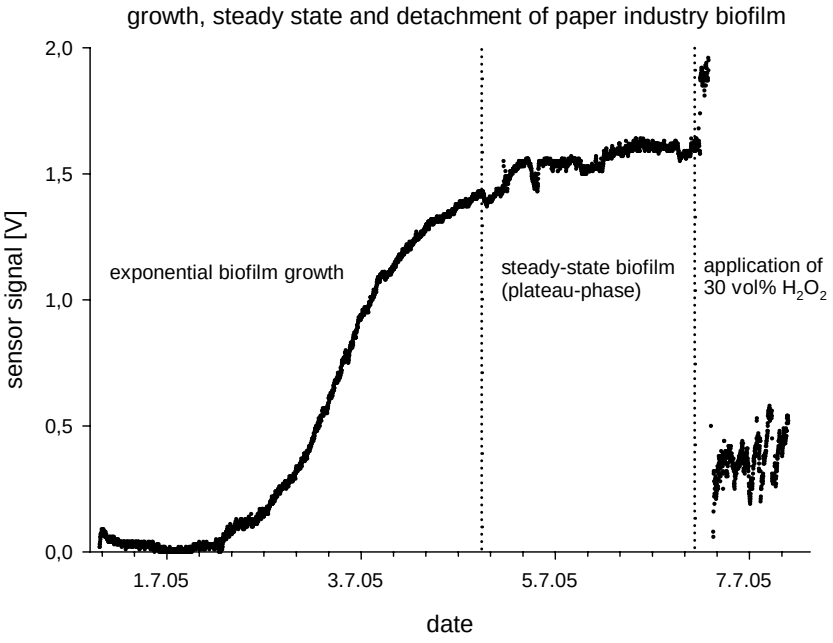

Figure 1: Signal response of the sensor due attachment and detachment of microbes in a laboratory tube reactor