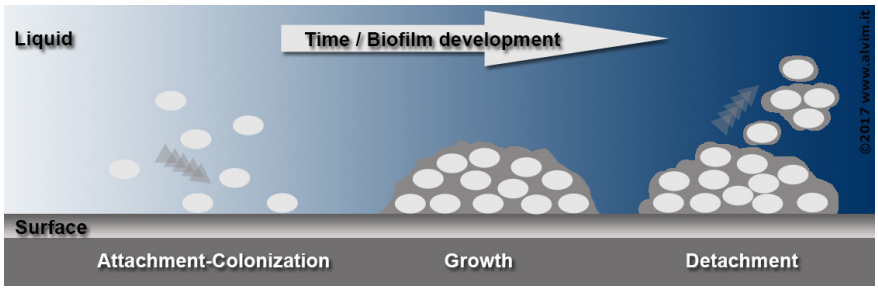
ALVIM

Biofilm Monitoring System

✓ Early detection of bacterial growth on surfaces

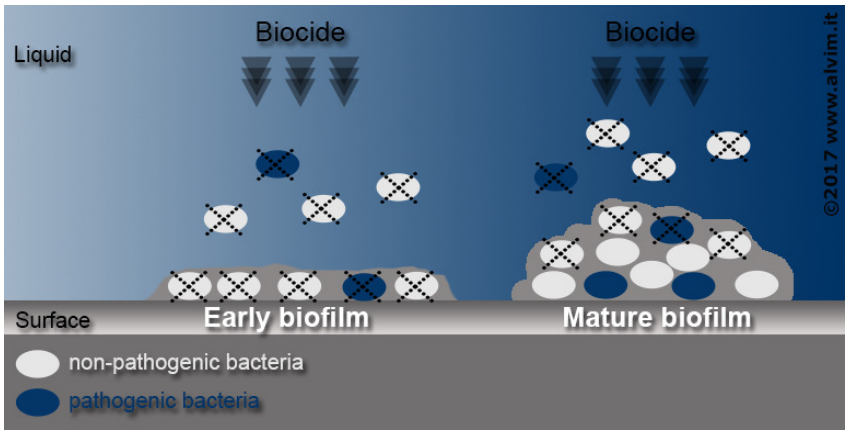
✓ Monitoring & optimization of sanitation treatments

Bacterial growth on surfaces in contact with water and other liquids, a phenomenon known as “biofilm”, is a major problem in many industrial applications. **Biofilm** can form on any surface, even in extreme conditions, and it **causes several issues**:



- **decrease in thermal efficiency of heat exchangers**, by 30% for a 20 micron-thick bacterial layer;
- **increase in inorganic deposit** (fouling), since bacteria produce sticky substances that facilitate the adhesion of other particles;
- **settlement of bigger organisms**, known as “macrofouling”, that can constrict water flow, increasing energy consumption;
- **microbiologically influenced corrosion (MIC)**, that accounts for multi-billion dollars of industrial damages all over the world.

These problems can eventually lead to pipe blockage and plant idle. **Sanitation treatments should be applied as soon as biofilm starts to grow**, since:



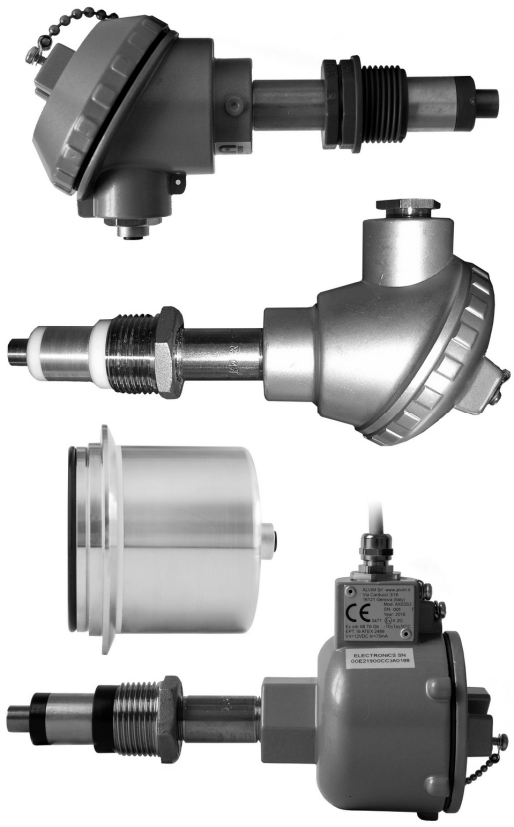
- it is much more difficult and expensive to kill biofilm, with respect to free-floating bacteria; the extracellular matrix (EPS) produced by biofilm, indeed, increases its **resistance to external agents** by three orders of magnitude (x1000). A mature biofilm has a thicker EPS matrix, thus it is much more resistant than an early-stage one.
- Biofilm is known to represent the ideal environment for the **survival and growth of pathogens**. It is therefore important to contrast biofilm formation, to minimize the risk of dangerous bacterial contamination.
- When biofilm is mature, its outermost layers tend to detach and float away. This increases the likelihood of **biofilm formation in other areas of the plant**.

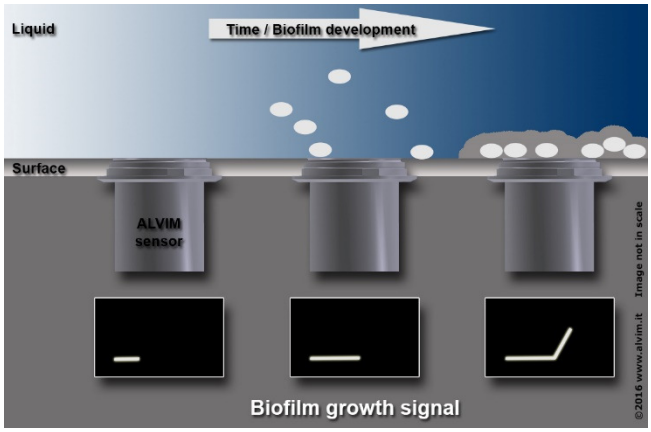
The ALVIM Biofilm Monitoring System

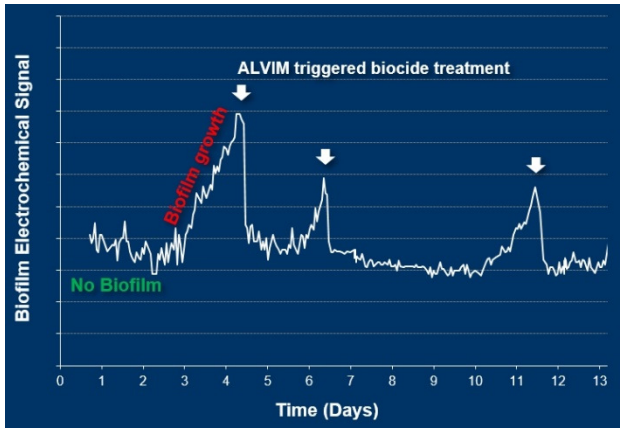
The ALVIM technology represents an effective and reliable tool for the detection of early-stage biofilm. Such monitoring is proven to be stable and highly sensitive (down to 1% of probe surface covered by biofilm).

This technology allows for a simple and flexible biofilm monitoring approach, considering different applications, such as:

- ✓ analysis and characterization of biofilm growth, in civil and industrial piping systems;
- ✓ assessment and comparative evaluation of different chemical biocides or sanitation treatments;
- ✓ real-time, continuous monitoring of water treatment systems;
- ✓ automatic and/or remote control and optimization of sanitation treatment;
- ✓ prevention of pathogens, like Legionella, Lysteria and Staphylococcus, in different fields (cooling towers, food production, drinking water, hospitals, etc.).







Among the users of the ALVIM Biofilm Monitoring System: