

**Kolwzan, B. Analysis of Biofilms – Their Formation and Functioning. *Ochrona Srodowiska* 2011, Vol. 33, No. 4, pp. 3–14.**

**Abstract:** Adhesion of bacterial cells to a diversity of surfaces is attributable primarily to the extracellular polymers produced by some microorganisms, and, additionally, to such structures as fimbria and cilia. A mature biofilm is composed of many different microcolonies, where microbial cells are integrated with each other by an extracellular polymeric substance (EPS). An EPS consists of polysaccharides, proteins, nucleic acids, surfactants, lipids and water. The cells in the biofilm interior are highly specialized forms capable of fulfilling a variety of functions, and their properties differ noticeably from those of the free cells. The structure and organization of these specialized microbial clusters protect them against adverse external influences. Proper functioning of the biofilm is guaranteed by quorum sensing *via* signaling molecules that freely diffuse from one bacterium to another. Being active participants in various microbiological processes, biofilms have now become commonplace. They are largely to blame for heavy losses in a country's economy, and for the potential to spread infections that are difficult to treat. The colonization of a water-pipe network by a biofilm carries serious risk to public health. In conclusion, good knowledge of the biofilm structure, as well as the proper understanding of the mechanisms underlying the formation and functioning of a biofilm, is a requisite not only for upgrading the efficiency of a technological process conducted in the presence of a biofilm, but also for developing new and effective methods of biofilm degradation.

**Keywords:** Biofilm, microorganisms, extracellular polymeric substance (EPS), quorum sensing.