

2. Biofilms, biocorrosion

A biofilm is a film created by micro-organisms prone to develop or to agglomerate on a surface.

It was reported at the turn of the century that certain biofilms developing on electrode surfaces offer intrinsic electrocatalytic properties. This led to emerging novel electrochemical concepts and processes, such as microbial fuel cells (MFC) and microbial electrolysis cells (MEC). In the bio-batteries, the microbial electro-catalysis directly provides electric energy based on the oxidation of different organic wastes and low-cost substrates (acetate, volatile fatty acids, biomass...). Thus, microbial power cells are now considered as novel approaches for effluent treatment. The same concept is involved in electrolytic cells for hydrogen production via the electrolysis of biomass.

Corrosion processes induced by micro-organisms, namely biocorrosion, is a major issue for materials used in numerous industrial activities: petroleum, electric, nuclear energy productions as well as port, agriculture setups... This originates from the degradation of conductive materials because of the presence of a biofilm on their surface. Deciphering the mechanisms of biocorrosion is a major issue for economic as well as environmental purposes. Recent studies showed that slight acids were involved in the initiation of these processes; the intrinsic role of enzymes, hydrogenases in particular, is widely debated in the community. Furthermore, it was postulated that the presence of biological species (*Geobacter*), different from sulfato-reductive bacteria, was correlated with sting corrosion events.