



**INSTITUTO DE INGENIERÍA  
BIOLÓGICA Y MÉDICA**  
PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE

**IIBM Seminar**  
**“Biofilm lifestyle of Bioleaching Microorganisms”**



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**Wednesday 28<sup>th</sup> September 2022 - 13:00 Hrs - Lunch included**

**Hybrid Seminar – Sala C-306 Const. Civil**

**Zoom link: Contact [secretariaiibm@uc.cl](mailto:secretariaiibm@uc.cl)**



## **“Biofilm lifestyle of Bioleaching Microorganisms”**

Bioleaching microorganisms are important for biotechnological applications in biomining of metal sulfides, mine water treatment and new applications involving synthetic biology. These are chemolithotrophic bacteria and archaea, able to mainly use iron and or sulfur as energy sources. thrive in planktonic state or forming biofilms, usually on the surfaces of metal sulfides or sulfur. The biofilm microbial lifestyle is characterized by genetically controlled changes, affecting several aspects of microbial metabolism. Biofilm formation include the production of extracellular polymeric substances (EPS) a mixture of hydrated biopolymers, mainly composed of polysaccharides, proteins, lipids, and extracellular DNA, plus a strong metabolic reorganization, which includes an enhanced expression of transport and recycling functions, as well as osmotic and stress responses. In addition, biofilm formation is controlled and coordinated by cell-cell communication phenomena (Quorum Sensing), and intracellularly driven by second messenger molecules such as cyclic-di-GMP.



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Biofilm formation on metal sulfides influences bioleaching. However, even after several years of research, many open questions remain open, and it is not clear if enhancement of biofilms will always lead to an enhanced bioleaching of relevant ores such as Chalcopyrite (main world copper reserves). As biofilm research is an interdisciplinary topic, developments in the fields of molecular biology, “omics” techniques, chemical analysis, advanced image analysis and nanotechnology have contributed to an improved understanding of this bioprocess.

Nevertheless, which processes are occurring at the molecular scale at microbe-mineral interfaces, is still unknown. In this lecture, genetic and nutritional aspects of biofilms and EPS production, their analysis by high-throughput microscopy studies, Omics, and bioinformatics, will be discussed with examples in axenic and mixed species bioleaching biofilms.