

# An immunological strategy to monitor in situ the phosphate starvation state in *Thiobacillus ferrooxidans*

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*Thiobacillus ferrooxidans* is one of the chemolithoautotrophic bacteria important in industrial biomining operations. During the process of ore bioleaching, the microorganisms are subjected to several stressing conditions, including the lack of some essential nutrients, which can affect the rates and yields of bioleaching. When *T. ferrooxidans* is starved for phosphate, the cells respond by inducing the synthesis of several proteins, some of which are outer membrane proteins of high molecular weight (70,000 to 80,000). These proteins were considered to be potential markers of the phosphate starvation state of these microorganisms. We developed a single-cell immunofluorescence assay that allowed monitoring of the phosphate starvation condition of this biomining microorganism by measuring the increased expression of the surface proteins. In the presence of low levels of arsenate (2 mM), the growth of phosphate-starved *T. ferrooxidans* cells was greatly inhibited compared to that of control