Abstract

The negative environmental impacts of the mining industry are well-known and include soil erosion, water pollution and loss of biodiversity (Australian Bureau of Statistics, 2003). One of the main causes of the pollution is the usage of chemical reagents during the mineral separation processes (Besser, 2009). Sulfide minerals are primary separated using froth-flotation. Chalcopyrite is one of the most abundant sources of copper in the world and pyrite is the worthless product produced from the separation of chalcopyrite. Froth-flotation is the most common method used to separate chalcopyrite and gangue minerals. A large amount of environmentally-harmful chemical reagents are used in this mineral separation processes to enhance its efficiencies, such as xanthate and cyanide. Bio-flotation is a new technique which uses microbes to replace those chemical reagents making for a more environmentally-friendly process.

Acidithiobacillus ferrooxidans is one of the most well-studied micro-organisms used in bio-flotation. Bacterial counting, Scanning Electron Microscopy, Elemental Dispersive Analysis by X-ray and X-ray photoelectron spectroscopy were used to determine the selective attachment of *A.f.* on chalcopyrite and pyrite and how it modifies the mineral surface. Micro-froth flotation tests and XRD analyses were performed to investigate how *A.f.* can be used to increase the separation efficiency of chalcopyrite.

The depression of the separation efficiency of pyrite has been observed after expose to *A.f.* for 72 hours which has correlates with the formation of biofilm through its SEM images.