

## 2 Objectives and research relevance

### 2.1. Main objective

To study and evaluate the behaviour of hematite using *the bacterial strain Rhodococcus ruber* as a flotation reagent, in a modified Partridge-Smith flotation cell.

### 2.2. Specific objectives

To evaluate and quantify the effect of pH, biomass concentration and flotation time in the floatability of hematite using *R.ruber*, in a new flotation cell device, such as the modified Partridge-Smith flotation cell.

To determine the behaviour of bacterial cells in hematite flotation, evaluating its properties as collector and/or frother.

To analyse the electrophoretic properties of *Rhodococcus ruber* and hematite before and after interaction.

To characterise by FTIR and SEM both hematite and *Rhodococcus ruber* strain.

### 2.3. Research relevance

Back in 2001, probably one of the first research works aiming the application of microorganisms as flotation reagents was made for the system hematite-quartz. The author, Mesquita (2001) choose such mineral system because Brazil occupied and still occupies an important place in the World ranking of production and exportation of Iron ores.

Almost thirteen years later, interesting results have been found applying bacterial strains to different mineral systems, from oxides to sulphides, as collectors, depressors, frothers or using the metabolic products excreted by them as reagents also. In this context, *Rhodococcus ruber* strain which was previously applied as hydrophobizing agent to improve bacterial attachment to a sawdust carrier (Ivshina *et al.*, 2013), and as biomass for the removal of cobalt and nickel solutions (Borges, 2012), will be used for the first time as a flotation bioreagent.

This research stands out by introducing three new subjects in Mineral Beneficiation: *Rhodococcus ruber* strain, Partridge-Smith flotation cell and use of flotanol as froth enhancer.

Since the bacteria strain *Rhodococcus ruber* is recently introduced in mineral beneficiation in this work, it was applied for the study of its interaction with hematite, with expectations of a similar behavior of the *Rhodococcus* strain as previous works. Also, it was evaluated its potential use as biofrother, with introducing complementary studies of bioflotation using a conventional frother (Flotanol D24) as a froth enhancer.

The flotation studies were carried out in a modified Partridge-Smith flotation cell, opening a new gate to future research of scaled microflotation.