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Enhanced bioleaching on attachment of indigenous acidophilic bacteria to pyrite surface

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In recent years, bioleaching has been widely applied on an industrial scale due to the advantages of low cost and environment friendliness. The direct contact mechanism of bioleaching assumes the action of a metal sulfide-attached cell oxidizing the mineral by an enzyme system with oxygen to sulfate and metal cations. Fundamental surface properties of sulfide particles and leaching-bacteria in bioleaching play the key role in the efficiency of this process. The aim of this work is to investigate of direct contact bioleaching mechanism on pyrite through attachment properties between indigenous acidophilic bacteria and pyrite surfaces. The bacteria were obtained from sulfur hot springs, Hatchobaru thermal electricity plant in Japan. And pyrite was collected from mine waste from Gwang-yang abandoned gold mines, Korea. In XRD analyses of the pyrite, x-ray diffracted d-value belong to pyrite was observed. The indigenous acidophilic bacteria grew well in a solution and over the course of incubation pH decreased and Eh increased. In relation to a bacterial growth-curve, the lag phase was hardly shown while the exponential phase was very fast. Bioleaching experiment result was showed that twenty days after the indigenous acidophilic bacteria were inoculated to a pyrite-leaching medium, the bacterial sample had a greater concentration of Fe and Zn than within the control sample. In SEM-EDS analyses, rod-shaped bacteria and round-shaped microbes were well attached to the surface of pyrite. The size of the rod-shaped bacteria ranged from 1.05∼1.10 [U+339B] to 4.01∼5.38 [U+339B]. Round-shaped microbes were more than 3.0 [U+339B] in diameter. Paired cells of rod-shaped bacteria were attached to the surface of pyrite linearly.