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隐藏嗜酸菌DX1-1和氧化亚铁硫杆菌CMS的紫外诱变育种及浸矿研究

杨宇，张帅， 徐爱玲， 邹俐宏， 历丽， 邱冠周

(中南大学 资源加工与生物工程学院，生物冶金教育部重点实验室，湖南 长沙，410083)

摘 要：对从江西大兴黄铜矿的酸性矿坑水中分离得到的氧化亚铁硫杆菌 CMS 和隐藏嗜酸菌 DX1-1进行紫外诱变育种及浸矿研究。结果表明：细菌CMS和DX1-1的最适生长温度为30 ℃，最适pH值分别为2.0和3.5；通过紫外诱变获得突变型隐藏嗜酸菌 DX1-1和氧化亚铁硫杆菌 CMS，最佳处理时间为60 s，正突变率分别可达到16.7%和20.0%；诱变后的隐藏嗜酸菌 DX1-1达到稳定期的时间比诱变前缩短20 h，并且具有更大的菌体浓度；诱变后的氧化亚铁硫杆菌 CMS氧化全部亚铁所需时间为48 h，比诱变前菌株缩短11 h；诱变后混合菌浸矿中，用原子吸收光谱法测定浸出30 d后铜离子质量浓度达到2.78 g/L，而紫外诱变前菌株浸出铜离子质量浓度为2.48 g/L；生物浸出30 d后，隐藏嗜酸菌 DX1-1与氧化亚铁硫杆菌 CMS的菌落个数比由11:变为20:1左右。

关键字：隐藏嗜酸菌；氧化亚铁硫杆菌；紫外诱变；生物浸出

UV-induced mutagenesis and bioleaching of Acidiphilium cryptum and Acidithiobacillus ferrooxidans

YANG Yu, ZHANG Shuai, XU Ai-ling, ZOU Li-hong, LI Li, QIU Guan-zhou

（Key Laboratory of Biometallurgy of Ministry of Education of China, School of Minerals Processing and Bioengineering, Central South University, Changsha 410083, China）

Abstract: The original strains Acidithiobacillus ferrooxidans CMS and Acidiphilium cryptum DX1-1 isolated from the drainage of some caves rich in chalcopyrite in Dexing in Jiangxi Province of China were studied by UV-induced mutagenesis and bioleaching. The results show that the optimum temperature and pH value are 30 ℃ and 3.5 for Ac. cryptum DX1-1, and 30 ℃ and 2.0 for At. ferrooxidans CMS, respectively. After being treated by UV radiating, the optimum UV radiating time of DX1-1 and CMS is 60 s and their positive mutation rates are 16.7% and 20.0%. Ac. cryptum after mutagenesis reaches stationary phase 20 h ahead of the original strain. The most active UV-mutated strain At. ferrooxidans CMS oxidizes all the ferrous ion in 48 h, which is 11 h less than its original strain. After bioleaching with the mixture of UV-mutated strains of At. ferrooxidans CMS and Ac. cryptum DX1-1, 2.78 g/L of copper can be extracted, which can be measured by atomic absorption spectrometry after 30 d, while 2.48 g/L copper can be extracted with the mixture of the original strains before UV-mutation. After bioleaching for 30 d, the proportion of cell density in the cultures of Ac. cryptum DX1-1 and At. ferrooxidans CMS is changed from 11: to approximately 20:1.

Key words: Acidiphilium cryptum; Acidithiobacillus ferrooxidans; UV-induced mutagenesis; bioleaching

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地 址：湖南省长沙市中南大学 邮编： 410083
电 话： 0731-88879765 传真： 0731-88877727
电子邮箱： zngdxb@mail.csu.edu.cn 湘ICP备09001153号