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一株耐铅细菌的分离鉴定及其吸附特性研究

Isolation, identification and Pb(II) biosorption characterization of a lead-resistant strain

关键词: [铅](#) [吸附](#) [节杆菌](#)

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作者 单位

金羽 1. 东北农业大学 资源与环境学院, 哈尔滨 150030;
2. 哈尔滨工业大学 城市水资源与水环境国家重点实验室, 哈尔滨 150090

曲娟娟 东北农业大学 资源与环境学院, 哈尔滨 150030

李影 东北农业大学 资源与环境学院, 哈尔滨 150030

顾海东 东北农业大学 资源与环境学院, 哈尔滨 150030

闫立龙 东北农业大学 资源与环境学院, 哈尔滨 150030

孙兴滨 东北林业大学 林学院, 哈尔滨 150040

摘要: 从某铅矿区土壤中筛选出一株耐铅细菌,对其进行初步鉴定,并对Pb²⁺吸附特性和机理进行研究.16S rDNA 序列相似性分析表明,该菌属于节杆菌属,将其命名为 *Arthrobacter scleromae* LY-1.菌株最大耐Pb²⁺浓度为500 mg · L⁻¹,此外,菌株对Zn²⁺、Cu²⁺、Ni²⁺、Co²⁺等重金属也有一定的耐受性.在初始Pb²⁺浓度为100 mg · L⁻¹、投菌量(鲜重)为10 g · L⁻¹、pH为6.0、温度为30℃、吸附时间为25 min时,吸附Pb²⁺效果较好,此时吸附率为99.61%,吸附容量为9.96 mg · g⁻¹,吸附等温方程符合Langmuir模型.透射电镜观察和红外光谱分析显示,菌株LY-1对Pb²⁺的吸附主要是细胞表面的吸附,菌体细胞表面的多种活性基团与Pb²⁺发生络合作用.

Abstract. A lead resistant bacterium was isolated from heavy metal-contaminated soil in a lead-zinc mining area. The bacterium was preliminarily identified and its Pb²⁺ removal characteristics were analyzed. The 16S rDNA sequence analysis revealed that this bacterium belongs to *Arthrobacter* sp. and was named as *A. scleromae* LY-1. Strain *A. scleromae* LY-1 possesses the capability of Pb²⁺ resistance up to 500 mg · L⁻¹ in aqueous solution. In addition, it also has certain resistance to other heavy metals such as Zn²⁺, Cu²⁺, Ni²⁺ and Co²⁺. Optimum conditions for maximum biosorption were found at pH of 6.0 with inoculation quantity of 10 g · L⁻¹ (fresh weight), initial Pb²⁺ concentration of 100 mg · L⁻¹, and contact time of 25 min at 30℃. Under such conditions, the adsorption rate and capacity reached 99.61% and 9.96 mg · g⁻¹, respectively. Efficient performance of the biosorbent is in accordance with Langmuir isotherm model. Transmission electron microscope (TEM) coupled with Fourier Transform InfraRed (FT-IR) results revealed that the biosorption process mainly happens on the surface of LY-1 cell and many active groups on the extracellular matrix can chelate the lead ions.

Key words. [lead biosorption](#) [Arthrobacter sp.](#)

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