

Use of solid state voltammetric gold-amalgam microelectrodes for the analysis of Zn adsorption to bacteria

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Metal contamination of water, soils and sediments has received significant attention due to its detrimental impact on the environment. Adsorption of metals to bacterial surfaces can play an important role in metal immobilization and removal [1]. The traditional approach to metal adsorption studies consists of a series of constant biomass suspensions with differing initial metal concentrations, or with a series of suspensions of fixed initial metal concentration and variable pH. The labile metal is quantified using atomic absorption spectroscopy (AAS) or inductively coupled plasma emission spectrometry (ICP-AES). Methods that can quantify adsorption on a single suspension while varying initial metal concentration and pH would significantly reduce work-load and potentially increase data precision and resolution [2].

In this study, cyclic and square-wave voltammetry with solid-state 100µm gold-amalgam electrodes [3] was used to quantify labile Zn during bacterial adsorption experiments. A conventional three electrode (working, counter, reference) cell was deployed into bacterial suspensions. Standard Zn stock solution was titrated against bacterial surfaces in the systems. Our initial results suggest that voltammetry with solid-state electrodes is a quick and effective technique for the study of metal adsorption. in bacterial suspensions.

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Geochemical study on the Bayan Obo enormous Fe-Nb-REE deposit: New proofs to its genesis

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The Bayan Obo enormous Fe-Nb-REE deposit is the largest REE deposit ever found in the world, occupied some 60-70% of total REE reserves, attracting geologists all over the world to investigate its mysterious genesis [1-8]. Genesis combined with geochemical and petrographic investigation on dolomite in Bayan Obo, Inner Mongolia have been studied based on geochemical and petrological characteristics.

Major elements indicate that the dolomite samples enrich in Ca, Mg, S, Mn and Fe. A positive correlation between CaO v.s. MgO, negative correlations between FeO v. s. CaO & MgO, and weak correlations between MgO v. s. Al₂O₃, K₂O, Na₂O and P₂O₅, and no obvious linear relationship between Al₂O₃ v. s. TiO₂ are observed.

The REEs show light REE enrichments and high REE depletions with the total REE amount ranging from 2344-134100 ppm (total LREE from 2313-131640ppm, total HREE from 26.74-1851ppm).

Based on element and isotopic data, it is proposed that the genesis of the dolomite dominated REE mineralization in Bayan Obo was a product of sedimentary origin metasomatism by carbonatite magma with derived fluids, led formation the unique Fe-Nb-REE deposit and enormous REE enrichments, according to the previous studies [6-8]. However, its mystery for genesis is still on debated.

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