A novel mutant strain of *Acidithiobacillus ferrooxidans* adapted to extremely low pH

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Introduction

Although *Acidithiobacillus ferrooxidans* (*At. f*) is widely used in mining and metallurgy technologies nearly over thirty countries at present, its application still stay in laboratory and pilot experiments for uranium recovery in China [1]. One of the key problem inhibited its industrialization application is lack of better adaptative strains with strong ferrous-oxidizing activity and stability at very low pH and high conductivity.

Results

A mutant strain of *At. f* was obtained by ultraviolet mutagenesis and directional screening with optimum pH between 1.2-1.8 and iron oxidized rate of 0.2g/L. h^{-1} (Fig.1). Physiological and 16SrDNA

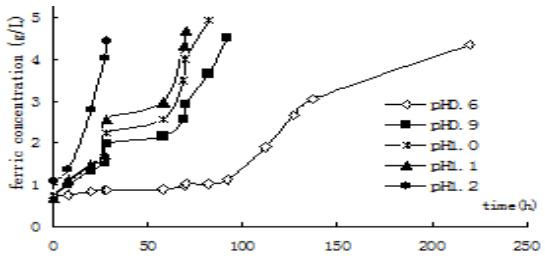

Figure 1: Iron oxidizing capacity with time at extremely low pH sequencing indicated it was *Acidithiobacillus ferrooxidans*.

Compared with the original strain, the characteristics of this mutant strain are as the following: (1) Relatively strong oxidized activity at pH1.2; (2) Relatively Stable in mineral medium after 8 times inoculations; (3) Growing at extremely low pH, even at pH=0.6. It is a promising strain likely being applied in comercial bioleaching.

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[1] L.Zhong-er, H.Yun-hong & C.Zhao-ling (2002) *Chinese Journal of Process Engineering* **2**(5), 415–419.

Estimating ground level $PM_{2.5}$ concentrations in Atlanta Metro Area using spatial statistical models

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Studies have shown that exposure to $PM_{2.5}$ (airborne particles less than 2.5 μm in size) may increase the risk of cardiovascular and respiratory diseases. Current $PM_{2.5}$ health effects studies rely on the often sparse ground monitoring networks to provide exposure estimates. We developed a geographically weighted regression (GWR) model to examine the relationship among $PM_{2.5}$, MODIS AOD, meteorological parameters, and land use information. Additionally, Two meteorological datasets: North American Regional Reanalysis (NARR) and North America Land Data Assimilation System (NLDAS), were fitted into the model separately to compare their performances. The root mean squared prediction error (RMSPE) showed that the prediction accuracy was 83.6% and 83.9% for NARR and NLDAS in model fitting, and 69.9% and 72.5% in cross validation. The results indicated that GWR combined with AOD, meteorological parameters, and land use information as the predictor variables could generate a better fit and achieve high accuracy in PM2.5 exposure estimation, and NLDAS could be used as an alternative of the NARR to provide some of the meteorological fields.

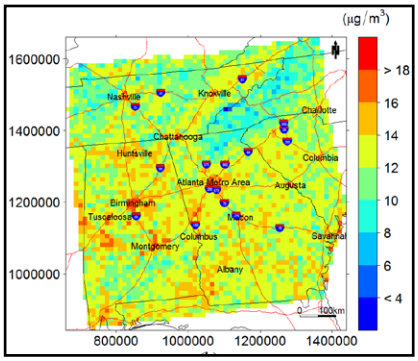

Figure 1: Predicted annual mean PM2.5 concentrations in 2003 using NLDAS meteorological fields.