Cr^{6+} reduction by sulfate-reducing bacteria in salt marsh sediments

C.H. LIU*, C. TANG, S.P. YAO AND Y.R. XUE

Nanjing University, 22 Hankou Road, Nanjing 210093 (*correspondence: chliu@nju.edu.cn)

Chromium is one of the most toxic and carcinogenic heavy metals. Cr^{2+} and Cr^{3+} species are the most stable and least toxic species, while Cr^{6+} is highly toxic to eukaryote and prokaryote. Recently, many bacteria have been proved to be an efficient Cr^{6+} removal in the chromium-contaminated sediment. In this study, 34 culturable sulfate-reducing bacteria (SRB) isolated from salt marsh along Yellow Sea of China were evaluated for their potential in Cr^{6+} removal. All procedures regarding bacterial manipulations were performed under aerobic condition with addition of 5mM of ethanol as carbon source and 100mg/L of Cr^{6+} in the medium (pH 7.3). Cells were grown in an shaker at 37 °C, 110 rpm for 6d. Cr^{6+} was quantified by the colorimetric diphenylcarbazide method at 540 nm, while the cell growth was measured at 600nm. Ten of the test SRB showed tolerant to high concentration of Cr^{6+} and 6 were able to reduce Cr^{6+} to Cr^{3+}, which were identified to be *Pseudomonas* sp.(3 isolates), *Bacillus sphaericus*, *Rhiodococcus erythropolis* and *Oceanimonas* sp.. The highest reduction of Cr^{6+} (82.6%) was by *Oceanimonas* sp., while 66.4%-79.7% were reduced by the others. However, the highest reduction rate per cell was by one of the *Pseudomonas* species. Except for *Pseudomonas* and *R. erythropolis* that were confirmed to be able to reduce Cr^{6+} to Cr^{3+}, *Bacillus sphaericus* and *Oceanimonas* were demonstrated at the first time to have a potential ecological role in soil or water bioremediation due to their tolerance or reduction of Cr^{6+} the removal of Cr^{6+}.

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Geothermal gradient and heat flow distributions of Northeastern Taiwan and its implication

CHIA-MEI LIU[1]*, SHENG-RONG SONG[1], FU-SHU JENG[2], EN-CHAO YEH[3], TAI-TIEN WANG[4] AND YI-CHIA LU[1]

[1]Institute of Geosciences, National Taiwan University, Taiwan (*correspondence: pollynismo@gmail.com, srsong@ntu.edu.tw, yichialu@ntu.edu.tw)

[2]Depart/ment of Civil Engineer, National Taiwan University, Taiwan (fsjeng@ntu.edu.tw)

[3]Department of Earth Sciences, National Taiwan Normal University, Taiwan (ecyeh@ntnu.edu.tw)

[4]Institute of Mineral Resources Engineering, National Taipei University of Technology, Taiwan (ttwang@ntut.edu.tw)

The continental heat flow map shows the characteristics of regional thermal structures and displays the phenomena of geology and geophysics. Taiwan Island is located in the boundary of Philippine Sea plate obliquely colliding with the Eurasia plate to form an orogenic belt. Meantime, the Philippine Sea plate also subducts northwardly under the Eurasian plate to produce the Ryukyu Trench-Okinawa Trough system in northern Taiwan. Based on the collision maturity in terms of geological and geophysical data, the tectonic of northeastern Taiwan belongs to the arc collapse/subduction zone. In this study, we apply the hydro-geochemical data to gain geothermal gradient and heat flow distributions of northeastern Taiwan, and discuss the possible mechanism inducing the thermal anomaly in this region.

The thermal profile across northeastern Taiwan indicates that the peak with a silica heat flow value about 150 mW/m^2 is located at the Chingshui area, and decreases northeastwardly to Ilan Plain and southwestwardly to Lushan area. According to the results of geodetic monitoring and micro-earthquakes, it has shown the extending southwestwardly from the southwest of the Okinawa Trough into the Ilan Plain, which induced widely the normal faulting and magmatic intrusion. Thus, the origin of the abnormally high silica heat flow in the Chingshui area is likely due to the southwestward propagation of hot fluids from the Okinawa Trough into the Ilan Plain.