Biosorption of heavy metals by using *Pseudomonas* sp. MF254A, bacterial strain isolated from the oil contaminated soil

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Experimental method

Batch experiments were performed to investigate the heavy metal removal efficiency of biosorption by using a bacterial strain which was identified as *Pseudomonas* sp. MF254A. *Pseudomonas* sp. MF254A was isolated from the oil contaminated soil at a military site in Korea. For the experiments, the initial concentration of heavy metals such as As, Cd, Cr, Cu, Pb, and Zn in the distilled water was titrated as 5 mg/L. The freeze-dried biosorbent (*Pseudo-monas* sp. MF254A) was added to the solution and the reaction mixture was shaken on an rotary shaker at 125 rpm for 120 min (30 ℃). The mixture was centrifuged and its supernatant was analyzed on ICP/MS for residual metal concentration. Various amounts of biosorbent (from 0.01 g to 3 g) were applied for the batch experiment to investigate the sorption efficiency of the biosorbent. The effect of pH on the biosorption capacity of the bacterial biomass for Pb, Cd, and Cu was investigated in the pH range of 1.0 – 12.0 by using 50 ml solutions containing 5 mg/L of metal ions.

Results and discussion

From the results of experiments, for Pb, Cd, and Cr, more than 98 % of intial metal ions in the solution was removed with 3 g of biosorbent. For Cu and Zn, the removal efficiency was 99 % and 91 % using 3 g of biosorbent, respectively. At pH value between 3.0 and 5.0, removal efficiencies of Pb, Cd, and Cu on biosorption were 95 ~ 99 %.

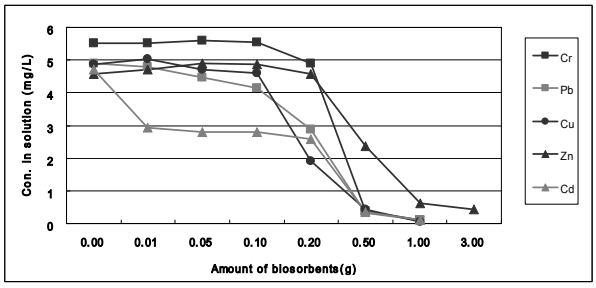

Figure 1: The decreases of heavy metal concentrations by the biosorption.

Conclusion

From the batch experiments, it was investigated that the bacterial strain, *Pseudomonas* sp. MF254A is a suitable biosorbent to remove heavy metals from the aqueous solution.

Spatio-temporal variations of winter CO_2 and CH_4 fluxes along a Alaska pipeline

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Research Aims

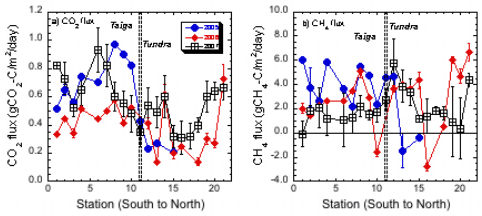
The purposes of researches are to estimate 1) how much winter fluxes of CO_2 and CH_4 along a trans-Alaska pipeline (total ca. 1000 km), 2) what are influencing factors in determining winter CO_2 and CH_4 estimates, and 3) what is implication in carbon budget as a region scale.

In order to conduct these purposes, we carried out winter transect observation during January 2005, Feburary to March 2006, and Feburary 2007.

Discussion of results

The spatio-temporal variation of winter CO_2 and CH_4 fluxes showed in Figure 1. Winter CO_2 fluxes in boreal forest are higher than those in tundra; on the other hands, winter CH4 is no variation at a time and space.

Figure 1. Spatio-temporal variation of winter CO_2 and CH_4 fluxes along a trans-Alaska pipeline



In special, winter CH_4 flux trends to emit through the snowpack to the atmsphere along a latitudinal transect. Kim *et al.* (2007) demonstrated that witner CH_4 emitted to the vascular plants at top of tussock in snow-covered boreal forest. The area of tussock in Northern Hemisphere is $6.5X10^{12}m^2$; Whalen and Reeburgh, 1992). The average winter fluxes of CO_2 and CH_4 were 0.51±0.03 gCO_2-C/m^2/day (average ± SE) and 2.7±0.3 $mgCH_4$-C/m^2/day, respectively. Therefore, the winter CH_4 emission should not be overlooked in estimations of the regional/global carbon budget.

References

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Whalen SC. and Reeburgh WS., (1992), *Global Biogeochem. Cycles* **5**, 261-273.