Title of Project : Development of next generation water resources circulation technology, using sulfur cycle microbes, applicable to developing countries

Takashi Yamaguchi
(Nagaoka University of Technology, Department of Civil and Environmental Engineering, Associate Professor)

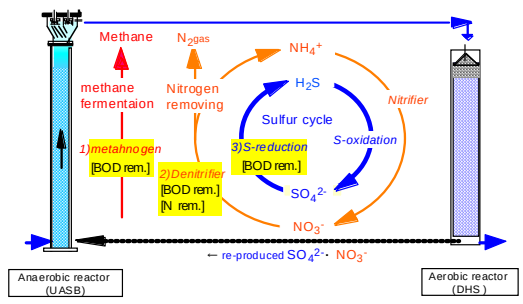
Research Area : Civil and environmental engineering

Keyword : Water and wastewater systems

【Purpose and Background of the Research】

In the developing countries, more than 90% of municipal sewage is discharged by not yet processing in rivers. Especially, in the urban region, water environment gets worse by population increase. Aggravation of water environment leads to pollution of a source of water supply, a problem to occur of digestive organ system illness, and it is reported that the death by water-affiliated illness extends to about 80% of all death rates really in a developing country (WHO). As for the main municipal sewage treatment method in the torrid zone / subtropical zone area, it is it with being anaerobic-processing method, but there is a little adapted sewerage treatment technical research and development in the condition that sewage temperature decreases in the Temperate Zone or highlands.

Proposed technology has the characteristic that even low temperature sewage of the Temperate Zone and the highlands where lower water temperature deteriorates in less than 10 degrees Celsius in the winter season by paying its attention to a sulfur cycle microbe. In addition, we try to reveal a reaction mechanism of a sulfur oxidation phenomenon in anaerobic condition. Aims of this study, it is development of applicable wastewater treatment techinology for developing countries, and contribute to improve that water environment.



Proposed wastewater treatment system

【Research Methods】

This study examine that performance of wastewater treatment system feeding actual sewage in ambient temperature conditions and microbial community, while it focused on contribution of the sulfur redox action.

- ○ Lab-scale wastewater treatment experiment for estimation of optimum operating method.
- ○ Pilot-scale actual wastewater treatment experiment for design real system.
- ○ Microbial structure analysis and sulfur redox microbial analysis.

【Expected Research Achievements and Scientific Significance】

Proposed system can suggest energy saving, the aquatic resources circulation technology. In addition, by technical development for a microbe search / habits elucidation and accumulation of fundamental knowledge, it contribute to implove of the field of environmental microbe.

【Publications Relevant to the Project】

- H. Sumino, M. Takahashi, T. Yamaguchi, K. Abe, N. Araki, S. Yamazaki, S. Shimozaki, A. Nagano, N. Nishio, Feasibility study of a pilot-scale sewage treatment system combining an up-flow anaerobic sludge blanket (UASB) and an aerated fixed-bed (AFB) reactor at ambient temperature, *Bioresource Technology*, 98, 177-182, 2007.
- T. Yamaguchi, Y. Bungo, M. Takahashi, H. Sumino, A. Nagano, N. Araki, S. Yamazaki and H. Harada, Low strength wastewater treatment under low temperature conditions by a novel sulfur redox action process, *Water Science and Technology*, 50, 6, 99-105, 2006.

【Term of Project】 FY2009-2013

【Budget Allocation】 81,000 Thousand Yen

【 Homepage Address and Other Contact Information】
http://ecolab.nagaokaut.ac.jp/
ecoya@vos.nagaokaut.ac.jp