

## International Conference on <u>c e s</u> Discovery Hydrology & Ground Water Expo

September 10-12, 2012 Hilton San Antonio Airport, USA

## Sulfur reclamation oriented biotechnology of denitrifying sulfide removal from organic wastewater

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In China, huge amount of sulfate and ammonia-laden wastewaters discharged from pharmaceutical industry, food fermentation and paper pulp per year, which need proper treatment prior to their safe disposal. In 2005, aiming at reclamation of elemental sulfur from sulfate-laden wastewater, we proposed an innovative integrated process system that can simultaneously remove sulfate, nitrate and organic carbons. This system consists of three process units, i.e. sulfate reduction and organic matter removal (SR-CR), autotrophic and heterotrophic denitrifying sulfide removal (A&H-DSR), and nitrification (AN). With optimal combination of these process units and fine-tuning of bioreactors, sulfate, ammonia and organic matter removals of 99%, 90% and 99% were obtained respectively to recover  $\geq$ 90% of elemental sulfur (S<sup>0</sup>) from the sulfide-laden wastewater streams. In this talk, we will mainly address the A&H-DSR process, in which, the autotrophic denitrifiers (aNR-SOB) converts sulfide to elemental sulfur using nitrate as electron acceptor (NO<sub>3</sub>- to NO<sub>2</sub>-); while the heterotrophic denitrifiers (hNRB) converts the yielded sulfide and residual fatty acids (mainly acetate) from SR-CR for denitrification (NO<sub>2</sub>- to N<sub>2</sub>). Our main breakthroughs achieved on A&H-DSR process are as follows: (1) a hypernormal desulfurization and denitrification (SDD) mechanism was disclosed, i.e. heterotrophic, not autotrophic bacteria contribute more for denitrifying sulfide removal. (2) Microbial physiological ecology law involving in sulfur biogeochemical cycle was updated via establishing the ecological models among functional groups of sulfate reducing bacteria (SRB), aNR-SOB, hNRB, carbonhydrates degradation organisms in the C-N-S removal process. (3) Directional control strategies for DSR process were developed.

## **Biography**

Aijie Wang has completed his Ph.D at the age of 28 years from Harbin Institute of Technology (China) and postdoctoral studies from Michigan State University. She is the ASM Ambassador to China, a chair professor in the Joint Center for Environmental Systems Biology and an Adjunct Professor in Oklahoma University, USA. She has published more than 80 papers in reputed journals and 3 monographs in Science Press, and has been rewarded 3 National Science and Technology Awards, and 5 Provincial Science and Technology Awards for her outstanding contribution in the field of wastewater biotreatment and wastes-to-resources.

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