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## PERFORMANCE ANALYSIS OF AN ALGAL-ACTIVATED SLUDGE SYMBIOTIC SYSTEM ON WASTEWATER TREATMENT, ALGAL-ACTIVATED SLUDGE CHARACTERISTICS AND COMMUNITY STRUCTURE: EFFECT OF SLUDGE CONCENTRATION

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This study focused on the effect of different sludge concentration on the performances of an algal-activated sludge symbiotic system in terms of wastewater treatment, algal-activated sludge characteristics and community structure. The results showed that the highest wastewater treatment performances were obtained in the reactor R2 (sludge concentration of 700 mg/L) with sCOD,  $\text{NH}_4^+\text{-N}$  and  $\text{PO}_4^{3-}\text{-P}$  removal efficiencies of  $90.6\pm 2.3\%$ ,  $97.69\pm 2.6\%$  and  $83.81\pm 2.3\%$  respectively. The relative coefficient between Chlorophyll-a (Chl-a) concentration and nutrients removal was in the declining trend of  $\text{NH}_4^+\text{-N} > \text{PO}_4^{3-}\text{-P} > \text{sCOD}$ , and decreased with the increase of sludge concentration indicating the increased sludge concentration inhibited the growth of algae. Further investigation exhibited that different sludge concentration resulted in the changes of dissolved oxygen (DO) and pH influencing the wastewater treatment and algae growth in the symbiotic system. Under the situation of nutrient deficiency, algae displayed superior nutrient utilization ability than sludge bacteria, contributing to the death and disintegration of sludge bacteria which led to the decline of total soluble solid (TSS) content after day 4. In addition, analysis

on the extracellular polymeric substances (EPS) production and Ps/Pr results revealed that the better nutrients removal and algae growth and the preferable settleability in R2 was positively related to its higher EPS production (99.79 mg/g-VSS) and Ps/Pr. The denaturing gradient gel electrophoresis (DGGE) profiles and gene sequences analysis demonstrated that some new species appeared and the functional microorganism was enriched under different sludge concentration, suggesting that both bacteria and algae had a selective power for particular members of each other. This study would provide some novel insights into the relationship between algal-activated sludge and be helpful to develop the algae-activated sludge system.

### Biography

Li Sun is from School of Environment in Harbin Institute of Technology. She is also a PhD candidate and a member of the State Key Laboratory of Urban Water Resource and Environment.

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