Electronic Supplementary Information

Investigation of the influence of Ni (II) Exposure on the Simultaneous Nitrification and Denitrification of Aerobic Granules from the Internal Oxygen Penetration Perspective

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Considering that the aerobic granules belong to microorganism aggregate, the equation proposed to calculate the DO penetration depths of aerobic aggregate in SBR Reactor by Feng et al. was simplified and used for calculating the DO penetration depth in the aerobic granular SBR. The DO penetration depths in the aerobic granular could be calculated as below.

$$\delta = \sqrt{\frac{6 \cdot C \cdot D_e}{q_{\max} \cdot C_x}}$$

Where δ is the DO penetration depth of granules (m); C is the DO concentration

in liquid area (g m^{-3}); *De* is the effective diffusion coefficient of DO in the surface of granule (in general $7.2\times10^{-6}m^2\ h^{-1}$); and q_{max} is the maximal specific DO uptake rate (mg O_2 g^{-1} MLSS h^{-1}).

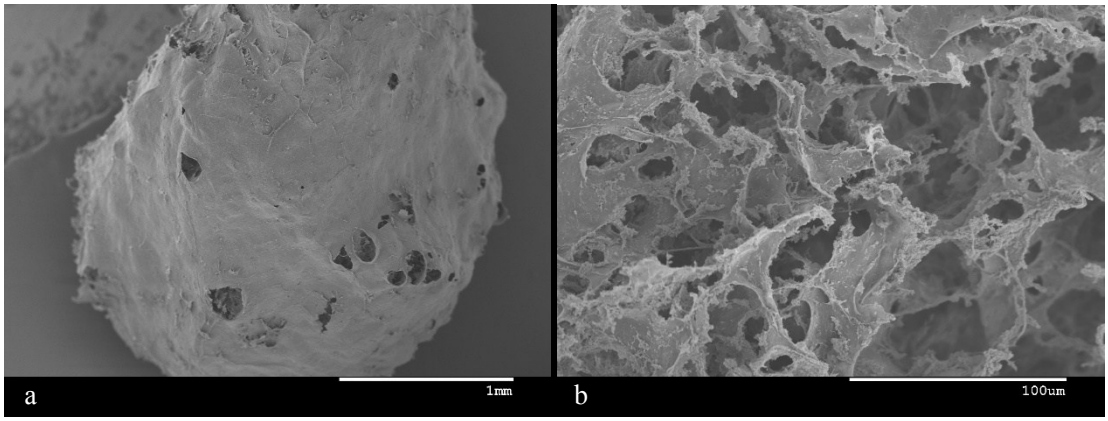

Fig. S1 The magnified SEM photographs of the aerobic granular sludge surface under concentrations of 0mg/L Ni(II). a: ×40, b: ×500.

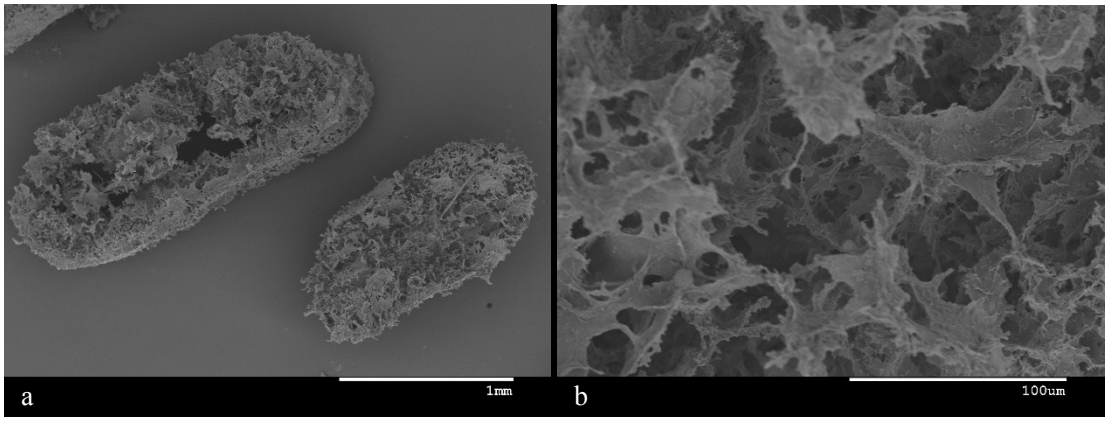

Fig. S2 The magnified SEM photographs of the aerobic granular sludge surface under concentrations of 1.0mg/L Ni(II). a: ×40, b: ×500.

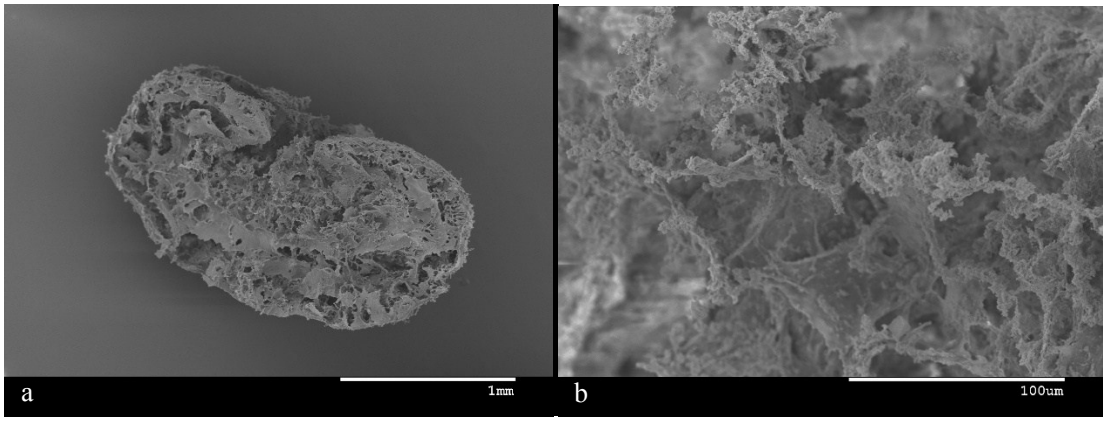

Fig. S3 The magnified SEM photographs of the aerobic granular sludge surface under concentrations of 5.0mg/L Ni(II). a: ×40, b: ×500.

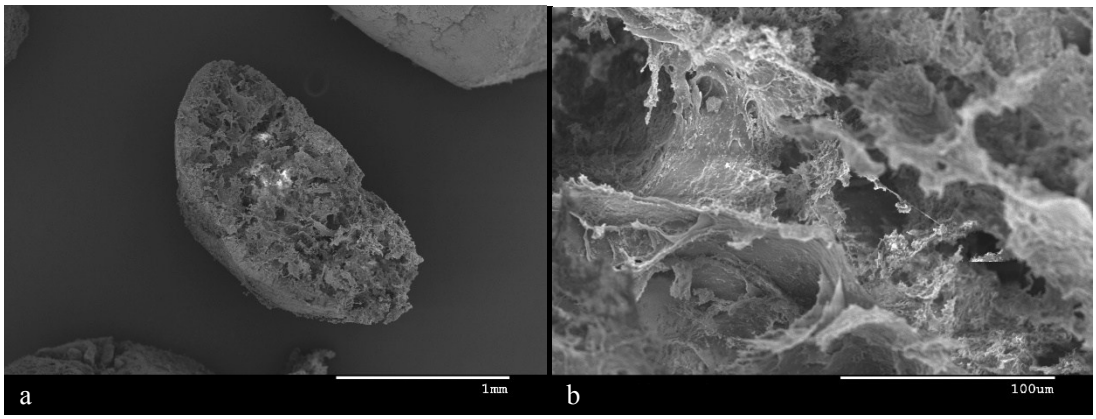

Fig. S4 The magnified SEM photographs of the aerobic granular sludge surface under concentrations of 10.0mg/L Ni(II). a: ×40, b: ×500.

Table S1 The calculating process displayed by the table

Ni(II) concentrations	0mg/L	1.0mg/L	5.0mg/L	10.0mg/L
C (mg/L)	7.6	7.8	7.9	7.6
qmax (mg O_2 g^{-1} MLSS h^{-1})	30.3	29.6	22.4	23.7
Cx (mg/L)	4750.0	5200.0	5870.0	5160.0
δ (mm)	1.51	1.48	1.61	1.64