**Supporting information**

**Biochar enhanced the nitrogen removal performance of heterotrophic nitrification-aerobic denitrification strain *pseudomonas fluorescent* sp. Z03 for insufficient carbon source wastewater under low temperature**

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Fig. S1 SEM images of BC400 (a-b) and BC700 (c-d)

Fig. S2 Zeta potential diagram of BC400 and BC700

Fig. S3 The adsorption effect of biochar control group on ammonia nitrogen within 12h.