Supporting Materials

Calculation of the contribution ratio of Anammox, Feammox and heterotrophic denitrification pathways to TN loss

During the stable operational period (day 126–194), the average total nitrogen (TN) removal efficiency reached 82.9% with a TN loss of 182.38 mg/L (220.00 mg/L*82.9%). On the basis of that 9.31 mg/L COD_{Cr} might be consumed for heterotrophic denitrification and that the theoretical C/N ratio for denitrification process via nitrite pathway is 1.71 g-COD/g-NO_2^--N, only 5.44 mg/L (9.31/1.71) NO_2^--N probably be removed via heterotrophic denitrification pathway.

According to Eq. (S1) and the NO_2^--N loss of 110 mg/L, the quantity of NH_4^+-N removal via Anammox pathways was 79.21 mg/L ((110.00—5.44)/1.32), the TN loss via Anammox pathway was 163.18 mg/L (79.21 + (110.00—5.44)—79.21*0.26).

$$NH_4^+ + 1.32NO_2^- + 0.066HCO_3^- + 0.13H^+ \rightarrow 1.02N_2 + 0.26NO_3^- + 0.066CH_2O_{0.5}N_{0.15} + 2.03H_2O \quad \text{(S1)}$$

The nitrogen removal amount via Feammox pathways was 13.76 mg/L (182.38—163.18—5.44), we can calculate that the proportion of nitrogen removal via Anammox, Feammox and heterotrophic denitrification pathways on TN loss was 89.5% (163.18/182.38), 7.5% (13.76/182.38) and 3.0% (5.44/182.38), respectively.

Table S1 The center peaks of XPS binding energy for Fe/AC

Substance	Fe 2p3/2 (eV)		Fe 2p1/2 (eV)	
Fe/AC-1	710.32	712.52	723.51	725.99
Fe/AC-2	710.58	712.54	723.63	726.08

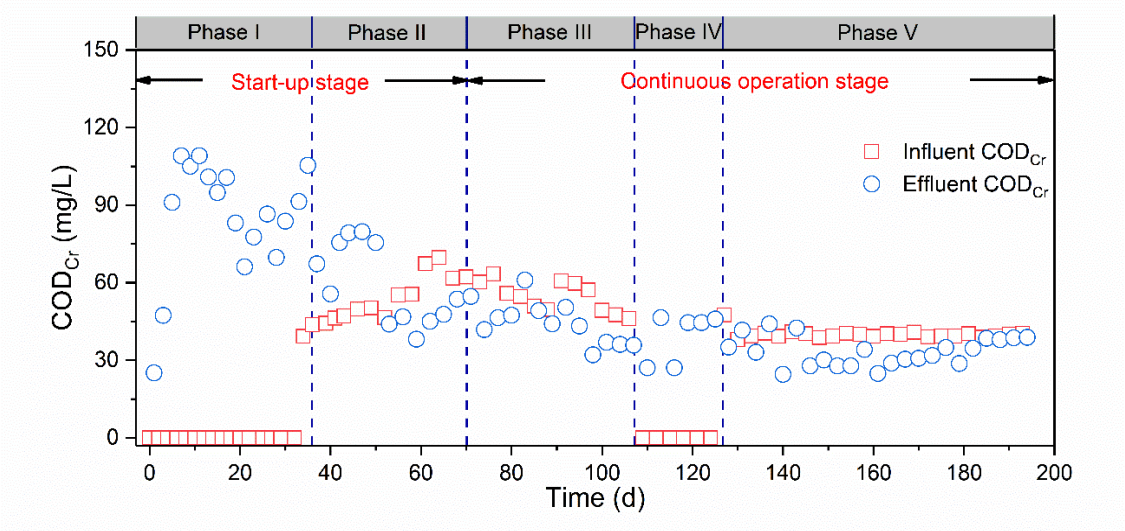

Fig. S1 Variation of influent and effluent COD_{Cr} in the EGSB during the long-term operation

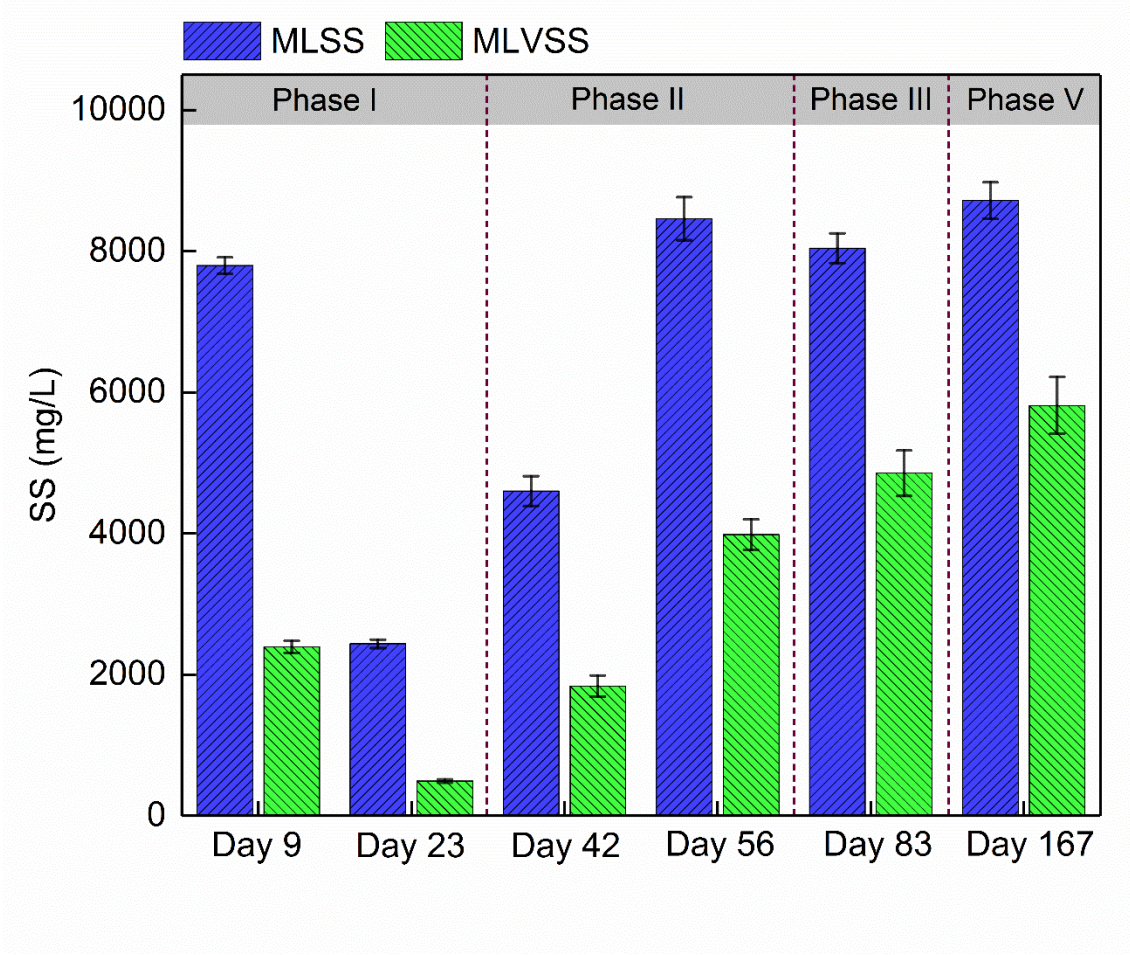

Fig. S2 Variation of MLSS and MLVSS in the EGSB during the whole experiment. The error bars indicate the standard deviation of duplicate measurements

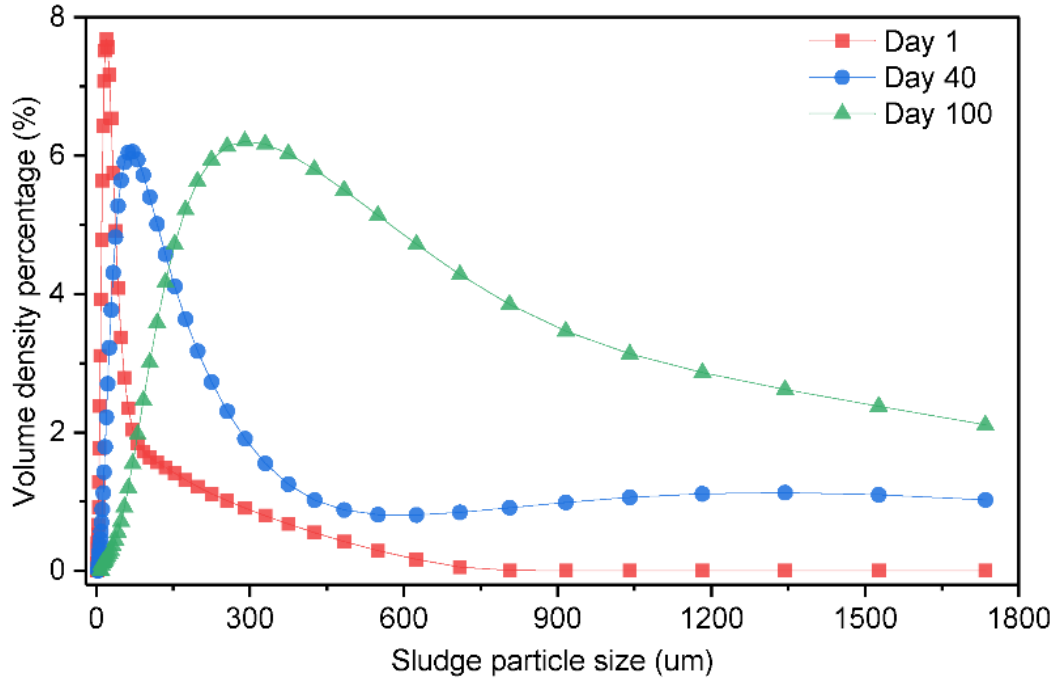

Fig. S3 Variations of the average sludge particle sizes and the percentage of relative volume density of the activated sludge samples in the EGSB during the long-term operational period

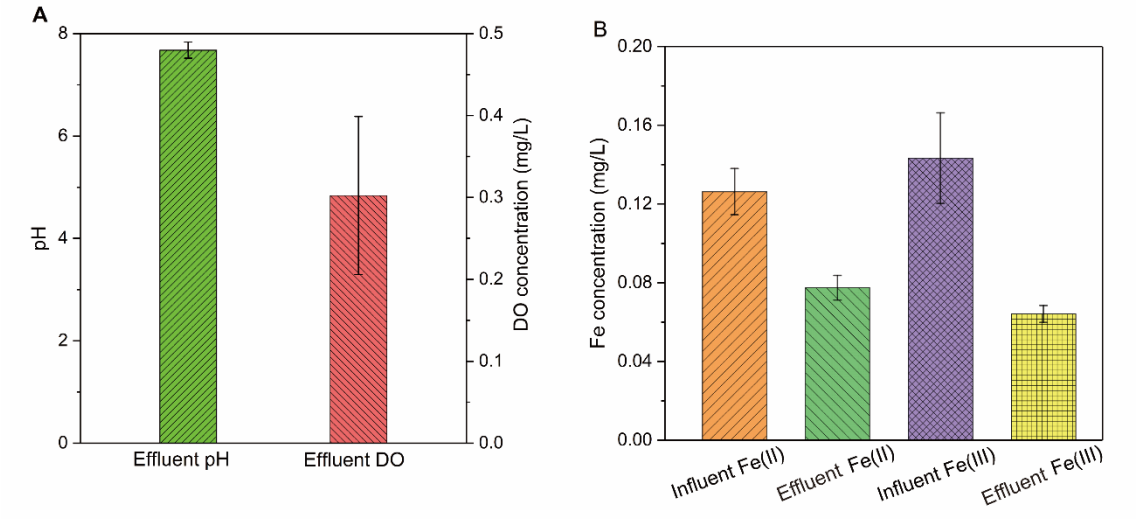

Fig. S4 The pH and DO in the reactor (A) and average influent and effluent Fe(II)/Fe(III) concentrations (B) during the whole experiment. The error bars indicate the standard deviation of duplicate measurements

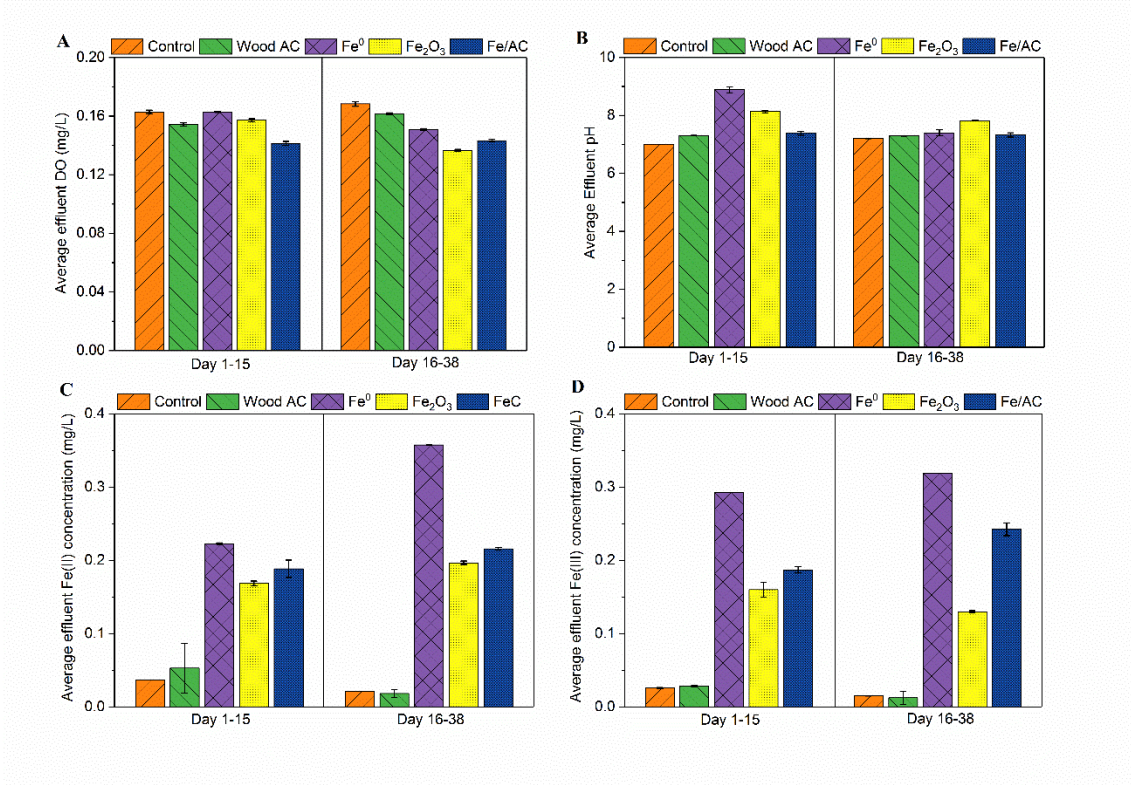

Fig. S5 The average DO (A), pH (B) in the reactor and average effluent Fe(II) (C) and Fe(III) (D) concentrations in batch experiment. The error bars indicate the standard deviation of duplicate measurements