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**Soil infiltration bioreactor incorporated with pyrite-based (mixotrophic)  
denitrification for domestic wastewater treatment**

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**ABSTRACT**

In this study, an integrated two-stage soil infiltration bioreactor incorporated with pyrite-based (mixotrophic) denitrification (SIBPD) was designed for domestic wastewater treatment. Benefited from excellent adsorption ability and water-permeability, soil infiltration could avoid clogging, shorten operating time and lower maintenance cost. Respiration and nitrification were mostly engaged in aerobic stage (AES), while nitrate was majorly removed by pyrite-based mixotrophic denitrification mainly occurred in anaerobic stage (ANS). Fed with synthetic and real wastewater for 120 days at 1.5 h HRT, SIBPD demonstrated good removal performance showing 87.14% for COD, 92.84% for  $\text{NH}_4^+\text{-N}$  and 82.58% for TP along with 80.72% of nitrate removed by ANS. TN removal efficiency was 83.74% when conducting real wastewater. Compared with sulfur-based process, the effluent pH of SIBPD was maintained at 6.99 - 7.34 and the highest  $\text{SO}_4^{2-}$  concentration was only 64.63  $\text{mg L}^{-1}$ . This study revealed a promising and feasible application prospect

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