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Short Communication

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Photosynthetic bacteria-based membrane bioreactor as post-treatment of an anaerobic membrane bioreactor effluent

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Abstract

Anaerobic membrane bioreactors have attracted increasing interest in the field of wastewater treatment. However, significant amounts of organic matter, nitrogen and sulphide in the effluent may limit its reuse. A photosynthetic bacteria-based membrane bioreactor is proposed for the further treatment of this effluent. A pilot-scale unit was run outdoor for over 900 h to assess the process performance at short hydraulic retention time. After an initial biomass development, simultaneous removal of soluble organic matter and nitrogen was achieved (65% and 39%, respectively). In addition, a significant concentration of sulphate was detected in the permeate, revealing an evident sulphide oxidation. Despite the accumulation of biopolymer clusters in the biological suspension, membrane fouling was effectively mitigated by air-aided backwashing, allowing a sustainable operation. Several strains of bacteria were identified including the photoheterotrophic bacteria *Rhodopseudomonas* sp. and the nitrifying and denitrifying bacteria *Chryseobacterium* sp.

Keywords: membrane photobioreactor; photoheterotrophs; *Rhodopseudomonas* sp.; membrane fouling; reclaimed water.

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