



## Enhancement of membrane filtration ability by pretreatment of secondary effluent using a new photocatalytic oxidation system

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### ABSTRACT

Secondary effluent including different kinds of foulants, e.g. extracellular polymeric substances (EPS), soluble microbial products (SMP), and humic acids was considered as a major barrier for wastewater reuse and reclamation when a membrane was applied to obtain high quality treated water. A new hybrid system of photocatalytic oxidation and non-woven membrane separation was studied for treating secondary effluent. Initially, the foulant properties, such as polysaccharide, protein, and biopolymer, etc., were examined in a batch test. The experimental results revealed that foulants in secondary effluent could be photodegraded. Then, a continuous experiment with this new hybrid system, three applied fluxes of 16.6, 33.3, and 50.0 L/m<sup>2</sup>/h (LMH), was applied to investigate the photodegradation ability and the filtration behavior. The results revealed that the concentration of foulants in permeate increased with increasing applied flux, due to the reduction of hydraulic retention time (HRT). In comparison with the system using microfiltration (MF) or ultrafiltration (UF) membrane, larger specific flux was obtained in our non-woven membrane system. In addition, a batch-stirred cell test using UF membrane was performed to compare filtration performance before and after photodegradation in secondary effluent. Such results proved that this new hybrid system was an effective treatment process for foulant removal in secondary effluent.

*Keywords:* Secondary effluent; Photocatalytic oxidation; EPS; Biopolymer; Non-woven membrane

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