


A review on future wastewater treatment technologies: micro-nanobubbles, hybrid electro-Fenton processes, photocatalytic fuel cells, and microbial fuel cells

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ABSTRACT

The future prospect in wastewater treatment technologies mostly emphasizes processing efficiency and the economic benefits. Undeniably, the use of advanced oxidation processes in physical and chemical treatments has played a vital role in helping the technologies to remove the organic pollutants efficiently and reduce the energy consumption or even harvesting the electrons movements in the oxidation process to produce electrical energy. In the present paper, we review several types of wastewater treatment technologies, namely micro-nanobubbles, hybrid electro-Fenton processes, photocatalytic fuel cells, and microbial fuel cells. The aims are to explore the interaction of hydroxyl radicals with pollutants using these wastewater technologies, including their removal efficiencies, optimal conditions, reactor setup, and energy generation. Despite these technologies recording high removal efficiency of organic pollutants, the selection of the technologies is dependent on the characteristics of the wastewater and the daily production volume. Hence the review paper also provides comparisons between technologies as the guidance in technology selection.

Key words: advanced oxidation processes, electrolysis, hydroxyl radicals, microbial fuel cell, photocatalysis, wastewater treatment

HIGHLIGHTS

- The important of hydroxyl radicals in water treatment.
- Fuel cell for energy recovery.
- Satisfactory high removal efficiency of organic pollutant.
- Materials used and factors affecting treatment efficiency and energy recovery.
- Sustainable energy supply from wastewater.