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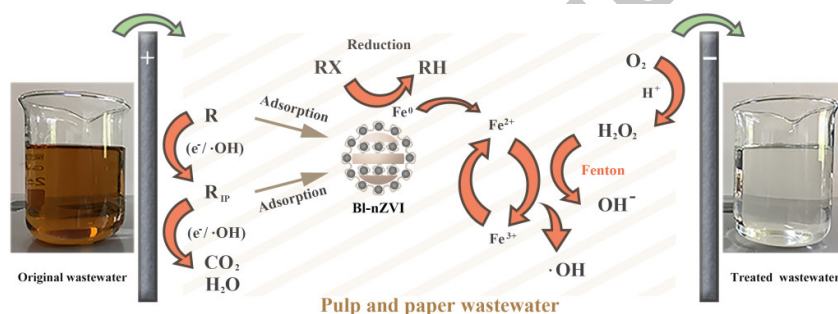
# Preparation of organosolv lignin-stabilized nano zero-valent iron and its application as granular electrode in the tertiary treatment of pulp and paper wastewater

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## Graphical Abstract



## Abstract

Organosolv lignin was used as stabilizer to synthesize Bentonite-Lignin nano zero-valent iron (BL-nZVI). Then FTIR, XRD, SEM and TEM were carried out to characterize this new material. Results proved that organosolv lignin can effectively prevent the aggregation of nano zero-valent iron particles. BL-nZVI was applied as particle electrodes and formed a three-dimensional (3D) electrode system with ruthenium/iridium coated titanium plates and acted as tertiary treatment process to dispose the pulp and paper secondary wastewater. The removal efficiency of the chemical oxygen demand (COD) and color of the effluent were selected as indicators to check the performance of the system. It was found that the removal efficiency of COD and color depended on the current density, electrolysis time, distance of electrode plates, initial pH value and particle electrode dosage. The optimal parameters of each factor were also determined by a series of single factor experiments. Under the optimum conditions, removal efficiency of COD and color can reach 87.6% and 93.1% respectively. Possible mechanism of the 3D electrode system with BL-nZVI particle electrodes for treatment of pulp and paper wastewater was also proposed.

**Keywords** Organosolv-lignin · nano zero-valent iron · Three-dimensional electrode system · pulp and paper wastewater

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