Novel bio-electro-Fenton technology for azo dye wastewater treatment using microbial reverse-electrodialysis electrolysis cell - DTU Orbit (29/09/2019)

Development of sustainable technologies for treatment of azo dyes containing wastewaters has long been of great interest. In this study, we proposed an innovative concept of using microbial reverse-electrodialysis electrolysis cell (MREC) based Fenton process to treat azo dye wastewater. In such MREC-Fenton integrated process, the production of H₂O₂ which is the key reactant of fenton-reaction was driven by the electrons harvested from the exoelectrogens and salinity-gradient between sea water and fresh water in MREC. Complete decolorization and mineralization of 400 mg L⁻¹ Orange G was achieved with apparent first order rate constants of 1.15 ± 0.06 and 0.26 ± 0.03 h⁻¹, respectively. Furthermore, the initial concentration of orange G, initial solution pH, catholyte concentration, high and low concentration salt water flow rate and air flow rate were all found to significantly affect the dye degradation. This study provides an efficient and cost-effective system for the degradation of non-biodegradable pollutants.