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Gaseous toluene powered microbial fuel cell: Performance, microbial community, and electron transfer pathway

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Abstract: A microbial fuel cell (MFC) was used to evaluate its performance of the gaseous toluene removal in this work. The experimental results revealed that the MFC exhibited a removal efficiency as high as 88% with a toluene concentration of 300 mg m⁻³. Moreover, the closed-circuit MFC exhibited 1.4 to 3.5 times higher toluene removal efficiency compared with the open-circuit MFC, indicating that the interaction between the electrodes and microorganisms accelerates the electron transfer rate and thus enhances the microbial degradation rate. The microbial community analysis indicated that, in the toluene-powered MFC, the growth of the exoelectrogens such as *Arcobacter* and *Geobacter* were inhibited and the toluene degraders such as *Chryseobacterium* and *Zoogloea* prevailed in the MFC. For example, *Arcobacter* was almost disappeared and *Geobacter* was decreased by 40% as the fuel in the MFC switched from the acetate to toluene. Moreover, compared with

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