

Use of filamentous fungi for improving electricity production and textile dye treatment in a microbial fuel cell

C Ottoni^{1,2}, L Peixoto¹, AE Maiorano², AG Brito^{1,3,4}

¹IBB-Instituto de Biotecnologia e Bioengenharia, Centro de Engenharia Biológica, Universidade do Minho, 4710-057, Gualtar, Braga, Portugal.

²IPT-Instituto de Pesquisas Tecnológicas do Estado de São Paulo, Centro de Tecnologia de Processos e Produtos, Laboratório de Biotecnologia Industrial, 05508-901, Butantã, São Paulo, Brasil.

³UIQA - Unidade de Investigação de Química Ambiental, Instituto Superior de Agronomia,

⁴Departamento de Ciências e Engenharia de Biosistemas, Universidade de Lisboa, 1349-017, Tapada da Ajuda, Lisboa, Portugal.

Contact e-mail: c.a.ottoni@hotmail.com

Abstract

Urban and industrial wastewaters have received an increased interest towards energy harvesting using microbial fuel cells (MFC). The combined use of microbial anode oxidizing organic substrates and enzymatic cathode reducing oxygen is a promising new approach for the simultaneous treatment of wastewater and generation of electricity. In this context, our study evaluated the performance of a two-chambered MFC operated with three laccase producing strains of filamentous fungi (Ff), immobilized on the cathodic compartment and filled up with simulated textile dye effluent (TDE) and urban wastewater in the anodic compartment. The result indicated a rapid TDE decolourisation (>86 % within 72 h). Electrochemical monitoring of the MFC during TDE decolourisation indicated power density (>35 mW m², control 3,61) and laccase activity (989.6 U l⁻¹) in the presence of *Pleurotus ostreatus* on the cathodic compartment. Considering the initial COD value of 464 ± 20 mg.l⁻¹, the organic removal in the anodic compartment after 20 days of MFC operation was 90.2%. Final toxicity measurements in the TDE treated indicated a much lower impact when compared to the original TDE. These are the initial studies to select Ff as models for MFC application and further adaptation for wastewater treatment and bioelectricity generation.