Article

Enhanced Current Generation Using Mutualistic Interaction of Yeast-Bacterial Coculture in Dual Chamber Microbial Fuel Cell

M. Amirul Islam[†], Baranitharan Ethiraj[‡], Chin Kui Cheng[†∥], Abu Yousuf[§], Selvakumar Thiruvenkadam[⊥], Reddy Prasad[#], and Md. Maksudur Rahman Khan[*†∥]

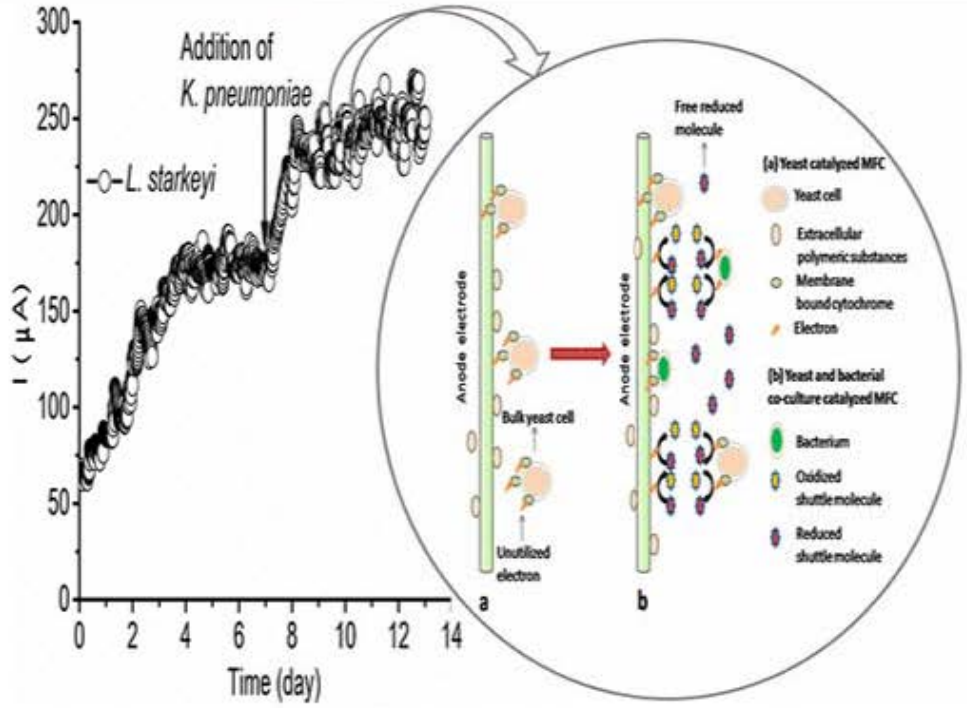
[†] Faculty of Chemical and Natural Resources Engineering, Universiti Malaysia Pahang, 26300 Pahang, Malaysia
[‡] Department of Biotechnology, Bannari Amman Institute of Technology, Sathyamangalam, Erode District, Tamil Nadu 638401, India
[§] Faculty of Engineering Technology, Universiti Malaysia Pahang, 26300 Pahang, Malaysia
[∥] Centre of Excellence for advancement Research Fluid Flow (CARIFF), Universiti Malaysia Pahang, 26300 Pahang, Malaysia
[⊥] Department of Chemical and Environmental Engineering, Universiti Putra Malaysia, 43400 Serdang, Malaysia
[#] Department of Petroleum and Chemical Engineering, Institut Teknologi, Gadong BE1410, Brunei

Ind. Eng. Chem. Res., **2018**, *57* (3), pp 813–821
DOI: 10.1021/acs.iecr.7b01855
Publication Date (Web): December 21, 2017

*E-mail: mrkhancep@yahoo.com; mrkhan@ump.edu.my. Tel: +6095492872.

Cite this: *Ind. Eng. Chem. Res. 57, 3, 813-821*
RIS Citation GO

Abstract



Although exogenous mediators can distinctly enhance the performance of yeast driven microbial fuel cell (MFC), the possibility of mediator's toxicity, environmental risk, and cost are the main challenges facing toward its application in MFCs. Therefore, the use of naturally produced electron shuttles for unmediated yeast would be of great interest since it can solve most of the above-mentioned problems. The present study is to investigate the possibility of the use of electron shuttle producing bacteria *Klebsiella pneumonia* (*K. pneumonia*) to boost up the performance of yeast *Lipomyces starkeyi* (*L. starkeyi*) driven MFC. The MFCs inoculated with *L. starkeyi* and *K. pneumoniae* coculture achieved a maximum power density of 12.87 W/m^3 which is about 3 and 6 times higher than that of MFC solely inoculated with pure yeast and bacteria, respectively, demonstrating that the yeast cells have successfully utilized the reduced electron shuttles excreted by the bacteria. The occurrence of the mutualistic interactions was further supported by the CV and EIS results. The findings of this work suggest that the use of mutualistic interaction of yeast and bacteria could be a new way to increase the performance of the MFCs.