Agrotechnol 2016, 5:3(Suppl)
http://dx.doi.org/10.4172/2168-9881.C1.022

Electron shuttles for bioremediation and more

Bor-Yann Chen
National I-Lan University, Taiwan

Electron shuttles (or redox mediators) are organic chemical(s) that can be reversibly oxidized and reduced to drive electron transport phenomena for energy extraction to support myriads of lives. Efficient energy recycling would provide economically-feasible route(s) to environmental remediation and cost-effective energy shuttling could optimize activities to sustain human health. Thus, using microbial fuel cells (MFCs) as operation strategy is economically-competitive for pollutant bioremediation. Considering reductive decolorization, accumulation of decolorized metabolites (DM) could significantly stimulate electron-transfer (ET) capabilities for dye degradation. In addition, model intermediate(s) with auxochromes (e.g., amino and hydroxyl substituent(s)-containing chemicals) could act as electron shuttles (ESs) to feedback stimulate MFC-assisted degradation. Moreover, quantitative assessment of simultaneous reductive decolorization and bioelectricity generation (SRD&BG) via MFCs indicated that ET capabilities of SRD&BG could be augmented more than 40-70% due to autocatalysis of DM. Apparently; MFC-aided bioremediation was promising to wastewater treatment due to redox-mediating characteristics of DM. In addition, impedance method in bioelectrochemistry was technically plausible as fingerprint probing for specific genus-related microalgae or microorganisms. As several edible flora (EF) contained crucial compositions to human health (e.g., antioxidants), extracts of EF were very likely to ET capabilities to augment performance of RD&BG. That is, such stimulating capabilities were very likely strongly associated to antioxidant characteristics of chemical species in EF. Evaluation of ET-stimulating characteristics of EF could thus be an indicator to prescreen whether candidate species of EF could be feasible antioxidant(s) for human health. As all lives utilize energy as driving force for sustaining diverse metabolic functioning, bioelectrochemistry is evidently vital to the biological world. As UN report mentioned, bioenergy will be a major portion of renewable energy for the planet's energy supply by 2050. Therefore, ESs will play a significant role of energy extraction not only for environmental remediation, but also human health.

boryannchen@yahoo.com.tw

Notes: