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Deciphering synergistic characteristics of medicinal herbs and edible flora to stimulate electrochemically-steered biorefinery

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Electron shuttle-stimulating microbial fuel cells is electrochemically promising to maximize performance of simultaneous wastewater treatment and bioproduct generation. Their prior studies revealed that bio decolorized intermediates owned capabilities as electron shuttles (ESs) to stimulate reductive decolorization and bioelectricity generation. Recent findings indicated that both antioxidant characteristics and electron-shuttling potential of chemical species were strongly associated. For medicinal herbs and edible flora, these properties are also directly proportional to contents of polyphenolics and/or flavonoids. Thus, this study quantitatively disclosed such relationships via electrochemical inspections for practicability. Moreover, the performance of bioelectricity generation using microbial fuel cells could be significantly augmented via supplementation of extracts of ES-rich medicinal herbs and edible flora. They also evaluated redox potential profiles (CV) and DPPH free radical scavenging capabilities of herbs or flora for the feasibility of bioelectrochemical applications. They also uncovered that extracts of *Syzygium aromaticum, Lonicera japonica* and green tea were promising ES-abundant herbs/flora for energy extraction/recycling. Due to reversible ES characteristics, wastes of medicinal herbs and edible flora were still feasible for reuse/recycling in electrochemically-steered applications to bioenergy and biorefinery.

Recent Publications

1. Chen B et al. (2013) Deciphering mediating characteristics of decolorized intermediates for reductive decolorization and bioelectricity generation. Bioresource Technology. 145:321-325.
2. Chen B et al. (2014) Exploring redox-mediating characteristics of textile dye-bearing microbial fuel cells: thionin and malachite green. Bioresource Technology. 169:277-283.
3. Han K et al. (2015) Deciphering synergistic characteristics of microbial fuel cell-assisted dye decolorization. Bioresource Technology. 196:746-751.
4. Chen B et al. (2016) Influence of textile dye and decolorized metabolites on microbial fuel cell-assisted bioremediation. Bioresource Technology. 200:1033-1038.
5. Hong J et al. (2016) Unraveling characteristics of nutrient removal and microbial community in a novel aerated landscape: activated sludge ecological system. Bioresource Technology. 212:280-288.

Biography

Bor Yann Chen has expertise in biomass energy and bioremediation for biotechnology. His serial studies focuses on applications in wastewater decolorization, bioremediation engineering, environmental toxicology and biofuel cells. Recently, his findings also deciphered chemical structures of electron shuttles and recalcitrant dyes which are crucial to simultaneous pollutant biodegradation and biomaterial/bioenergy recycling for sustainable green technology. Considering environmental friendliness, this study explored natural bioresources (e.g., medicinal herbs and edible flora) for bioenergy and high-value production generation. He has provided different alternatives to re-evaluate indigenous biomaterials with electrochemical potentials for bioenergy extraction, biorefinery development and derived applications.

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