EuroSciCon

9th Edition of International Conference on

Biofuels and Bioenergy

March 29-30, 2018
Edinburgh, Scotland

Arch Chem Res 2018, Volume 2
DOI: 10.21767/2572-4657-C1-003

MAXIMIZING THE EFFICIENCY OF BIOENERGY GENERATION: DESIGNING MECHANISM OF BIOFUEL AND ELECTRICITY PRODUCTION WITH RHODOPSEUDOMONAS PALUSTRIS

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Rhodopseudomonas palustris **is a photosynthetic bacterium that encompasses four different modes of metabolism. One mode is extremely valuable for its ability to digest lignocellulose and produce furan-containing fatty acid(FFA) which has applications in pharmaceuticals, biofuels and industrial solvents. Additionally, furan derivatives and phenolic compounds (byproducts of FFA) are proven to be electron donors for electricity generation through *R palustris*. Microbial Fuel Cell (MFC)is a promising approach for renewable energy research, and non-straight-chain fatty acids are valuable in many ways if generated in large quantities. Here in this paper, we propose a novel mechanism to effectively recombine these two features of *R.palustris*. Glucose-rich medium that also contains furan derivatives is used to grow cell culture at the anode. Carbon cathode and platinum wires will be used to transfer electrons from anode to cathode where they will subsequently be consumed by *R.palustris* mutants that synthesize di-methyl-furan-fatty acid. Methods including genetic engineering are used to create ΔChrR mutants that will amplify the enzymes in this pathway. Production of the products will theoretically be facilitated by the change in electrical potential across the cell membrane as the bacteria accept electrons from the anode. Furan derivatives will be fed back into the anode chamber externally in the reactor.**

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