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Microbial Factories and Exploiting Synergies of Bioreactor Technologies to Produce Bioproducts

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Abstract:

Microbial factories, including microalgae biofactories, have the enormous potential to produce biochemicals for manufacturing diverse bioproducts. A strategic approach to biofactories is maintaining cultures in bioreactors with sufficient resource inputs to optimize biochemical precursors for manufacturing bioproducts. Exploiting synergies that use the waste output from a bioreactor containing one microbial culture as a resource input to another bioreactor with a different microbe can lead to overall efficiencies in biofactories. In this paper, two synergies are evaluated. The first is between yeast and algae bioreactors, where data are presented on oxygen (O_2) uptake by aerobic yeast cultures and their production of carbon dioxide (CO_2) and the uptake of CO_2 by algae and their production of O_2. The second focuses on a carbon capture reactor, which is utilized to increase CO_2 levels to promote higher algal production. This approach of waste as a resource for bioreactor cultures is a novel synergy that can be important to bioreactor designs and, ultimately, to the production of bioproducts.

Keywords: bioreactors, synergies, carbon capture, bioproducts