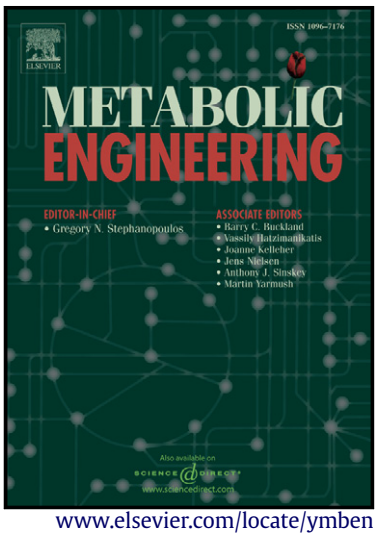

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A state of the art of metabolic networks of unicellular microalgae and cyanobacteria for biofuel production

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Abstract

The most promising and yet challenging application of microalgae and cyanobacteria is the production of renewable energy: biodiesel from microalgae triacylglycerols and bioethanol from cyanobacteria carbohydrates. A thorough understanding of microalgal and cyanobacterial metabolism is necessary to master and optimize biofuel production yields. To this end, systems biology and metabolic modeling have proven to be very efficient tools if supported by an accurate knowledge of the metabolic network. However, unlike heterotrophic microorganisms that utilize the same substrate for energy and as carbon source, microalgae and cyanobacteria require light for energy and inorganic carbon (CO_2 or bicarbonate) as carbon source. This double specificity, together with the complex mechanisms of light capture, makes the representation of metabolic network nonstandard. Here, we review the existing metabolic networks of photoautotrophic microalgae and cyanobacteria. We highlight how these networks have been useful for gaining insight on photoautotrophic metabolism.