

Insights: Publications

Unveiling salinity effects on photo-bioelectrocatalysis through combination of bioinformatics and electrochemistry

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Little is known about the adaptation strategies utilized by photosynthetic microorganisms to cope with salinity changes happening in the environment, and the effects on microbial electrochemical technologies. Herein, bioinformatics analysis revealed a metabolism shift in *Rhodobacter capsulatus* resulting from salt stress, with changes in gene expression allowing accumulation of compatible solutes to balance osmotic pressure, together with the up-regulation of the nitrogen fixation cycle, an electron sink of the photosynthetic electron transfer chain. Using the transcriptome evidence of hindered electron transfer in the photosynthetic electron transport chain induced by adaption to salinity, increased understanding of photo-bioelectrocatalysis under salt stress is achieved. Accumulation of glycine-betaine allows immediate tuning of salinity tolerance but does not provide cell stabilization, with a $40 \pm 20\%$ loss of photo-bioelectrocatalysis in a 60 min time scale. Conversely, exposure to or inducing the expression of the *Rhodobacter capsulatus* gene transfer agent tunes salinity tolerance and increases cell stability. This work provides a proof of concept for the combination of bioinformatics and electrochemical tools to investigate microbial electrochemical systems, opening exciting future research opportunities.