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Development of stable recombinant *cyanobacteria* for economically competent solar-fuel-factories: ethylene production

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Greenhouse gas emissions and limited fossil fuel reserves increase the need to find alternative ways to generate substitutes for petroleum-derived products such as ethylene. Ethylene is a simple alkene of commercial value due to multitude of large-scale uses in plastic industry and ever growing demand. One of the promising approaches is to use *cyanobacterial* cells as biological factories, through their photosynthetic capacity to produce ethylene using atmospheric CO_2 and water as substrates. The biosynthesis of ethylene has been studied in *Synechococcus* sp 7942 by over-expressing the heterologous ethylene forming enzyme (efe) from *Pseudomonas syringae* which converts the endogenous metabolic precursor 2-oxoglutarate to ethylene. As a volatile gas, ethylene then diffuses out from the cell and spontaneously separates into the culture headspace for collection and analysis. We have studied different aspects of observed genetic instability which have earlier compromised prolonged ethylene production in *Synechococcus*, and have developed stable production strains capable of sustained autotrophic ethylene biosynthesis. Although the production levels still remain below the threshold required for commercial applications, cyanobacteria have been intensively studied in this respect, and a range of molecular biology tools and production platforms are being developed and characterized.

Biography

Veronica Carbonell is Licentiate on Environmental Sciences by the University of Miguel Hernandez with strong international background and has participated in international programs such as Erasmus at Free University of Brussels (Belgium), FARO at John Innes Center (UK) and IAESTE at Silesian University of Technology (Poland). Currently, she is pursuing her PhD from the University of Turku, Finland.

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