Sulfate-reducing electroautotrophs and their applications in bioelectrochemical systems.

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Details

Abstract

Electroautotrophs are microbes able to perform different biocathodic reactions by using CO_2 as sole carbon source and electrochemical reducing power as a sole energy source. Electroautotrophy has been discovered in several groups of microorganisms, including iron-oxidizing bacteria, iron-reducing bacteria, nitrate-reducing bacteria, acetogens, methanogens and sulfate-reducing bacteria. The high diversity of electroautrophs results in a wide range of Bioelectrochemical Systems (BES) applications, ranging from bioproduction to bioremediation. In the last decade, particular research attention has been devoted toward the discovery, characterization and application of acetogenic and methanogenic electroautotrophs. Less attention has been given to autotrophic sulfate-reducing microorganisms, which are extremely interesting biocatalysts for multiple BES technologies, with concomitant CO_2 fixation. They can accomplish water sulfate removal, hydrogen production and, in some case, even biochemicals production. This mini-review gives a journey into electroautotrophic ability of sulfate-reducing bacteria and highlights their possible importance for biosustainable applications. More specifically, general metabolic features of autotrophic sulfate reducers are introduced. Recently discovered strains able

to perform extracellular electron uptake and possible molecular mechanisms behind this electron transfer capacity are explored. Finally, BES technologies based on sulfate-reducing electroautotrophs are illustrated

Involved units

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