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Sommario/riassunto	<p>The increasing demand for energy worldwide, currently evaluated at 13 terawatts per year, has triggered a surge in research on alternative energy sources more sustainable and environmentally friendly. Bio-catalyzed electrochemical systems (BESs) are a rapidly growing biotechnology for sustainable production of bioenergy and/or value-added bioproducts using microorganisms as catalysts for bioelectrochemical reactions at the electrode surface. In the last decades, this biotechnology has been intensively studied and developed as a flexible and practical platform for multiple applications such as electricity production, wastewater treatment, pollutants remediation, desalination and production of biogas, biofuels, or other commodities. BESs could have a critical impact on societies in many spheres of activity and become one of the solutions to reform our petroleum-based economy. However, BESs research has so far been limited to lab scale with the notable exceptions of pilot scale microbial fuel cells for brewery and winery wastewater treatment coupled with electricity generation. In general, more knowledge has to be acquired to overcome the issues that are stymieing BESs development and commercialization. For example, it is critical to understand better microbial physiology including the mechanisms responsible for the transfer of electrons between the microbes and the electrodes to start optimizing the systems in a more rational manner. There are many BES processes and for each one of them there is a multitude of biological</p>

and electrochemical specifications to investigate and adjust such as the nature of the microbial platform, electrode materials, the reactor design, the substrate, the medium composition, and the operating conditions. The ultimate goal is to develop highly energy efficient BESs with a positive footprint on the environment while maintaining low cost and generating opportunities to create value. BESs are complex systems developed with elements found in multiple fields of science such as microbiology, molecular biology, bioinformatics, biochemistry, electrochemistry, material science and environmental engineering. Given the high volume of research activities going on in the field of BESs today, this e-book explores the current challenges, the more recent progresses, and the future perspectives of BESs technologies. The BESs discussed here include microbial fuel cells, microbial electrolysis cells, microbial electrosynthesis cells, microbial electroremediation cells, etc.

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