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Nota di contenuto	Chapter 1: Introduction to Biohydrogen: Advancements, Challenges, and Perspectives of the Cleanest Biofuel -- Chapter 2: Molecular Hydrogen (H2) Metabolism in Microbes: A special focus on biohydrogen production -- Chapter 3: Biohydrogen: Microbiology and Microbial Dynamics in Dark Fermentation -- Chapter 4: Biohydrogen Production in Anaerobic Reactors -- Chapter 5: Biohydrogen production by mono- versus co- and mixed cultures -- Chapter 6: Biohydrogen production by photosynthetic microorganisms -- Chapter 7: Metabolic engineering and synthetic biology in biohydrogen production -- Chapter 8: Substrate composition and effects on biohydrogen production -- Chapter 9: Biomass immobilization in biohydrogen production -- Chapter 10:Enhancement of biohydrogen production using chemical additives and nanoparticles -- Chapter 11: Feedstocks and cases I - Biohydrogen production from agroindustrial wastes – pretreatment, process engineering and techno-economic analysis -- Chapter 12: Feedstocks and cases II - Bioprocessing of domestic wastewater and sewage sludge for biohydrogen production: different routes and

pretreatment strategies -- Chapter 13: Feedstocks and cases III - Biohydrogen from algal biomass (macro and microalgae) -- Chapter 14: Biohythane production -- Chapter 15: Volatile fatty acids production and recovery in biohydrogen production -- Chapter 16: Biohydrogen and polyhydroxyalkanoates coupled production -- Chapter 17: Microbial electrolysis cells for biohydrogen production from effluents -- Chaper 18: Gas mass transfer and system pressure in biohydrogen production -- Chapter 19: Computational modelling and optimization strategies for biohydrogen production -- Chapter 20: Various routes for hydrogen production and its utilization for sustainable economy -- Chapter 21: Biohydrogen downstream processing and storage systems -- Chapter 22: A Life cycle assessment and economic perspective of biohydrogen production -- Chapter 23: Biohydrogen and the circular economy: Insertion of biohydrogen production in biorefineries aiming at zero-waste processes -- Chapter 24: Patents in biohydrogen production.

Sommario/riassunto

Biohydrogen is the cleanest biofuel. It has the highest energy content by weight and burns cleanly – generating just water. It is the best choice for fuel cells, where it generates electricity directly, in its reaction with oxygen. Biohydrogen appears naturally as part of gases from mammal digestive systems, and it can be produced in specially designed anaerobic biodigesters, or through photocatalysis with microalgae. The gas is also easy to purify and use. As a green hydrogen obtained through bioprocesses, economical biohydrogen production is full of challenges and opportunities: from efficient and fast substrate conversion to storage, transportation, and safe use, there are several aspects that must be developed. Research in this field attacks the challenge of large-scale, efficient production from several directions: substrate pretreatment to enhance digestibility, metabolic networks analysis, and microbial diversity and succession to highlight constraints in production, bioreactor, and downstream design to improve throughput and reduce costs, to cite a few. This volume presents a brief introduction to biohydrogen production, and then explores the recent advances and developments in the area, in twenty four chapters written by specialists on the matter.