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Microbial Fuel Cells (MFCs) (Fig. 1a and
b) and more recently extended into various
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A complete, up-to-date, introductory guide to fuel cell technology and application.

Fuel Cell Fundamentals provides a thorough introduction to the principles and practicalities behind fuel cell technology. Beginning with the underlying concepts, the discussion explores fuel cell thermodynamics, kinetics, transport, and modeling before moving into the application side with guidance on system types and design, performance, costs, and environmental impact.

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Polymer electrolyte membrane (PEM) fuel cells are electrochemical devices that directly convert the chemical energy stored in fuel into electrical energy with a practical conversion efficiency as high as 65%. In the past years, significant progress has been made in PEM fuel cell commercialization. By 2019, there were over 19,000 fuel cell electric vehicles (FCEV) and 340 hydrogen refueling stations (HRF) in the U.S. (~8,000 and 44, respectively), Japan (~3,600 and 112, respectively), South ...

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Hydrogen is a clean fuel that, when consumed in a fuel cell, produces only water. Hydrogen can be produced from a

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Applications of domestic resources, such as natural gas, nuclear power, biomass, and renewable power like solar and wind.

These qualities make it an attractive fuel option for transportation and electricity generation applications.

Hydrogen Fuel Basics | Department of Energy

Because fuel Fuel cell, battery (a) Chemical energy 1 Electrical energy 4 Heat energy 2

Mechanical energy 3 Combustion engine

(b) Fuel tank Battery Fuel cell or

combustion engine Work out Work out

Figure 1.5. Schematic comparison of fuel cells, batteries, and combustion engines.

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Fuel Cells and Hydrogen: From

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provides an overview of the basic

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Fuel Cells and Hydrogen | ScienceDirect
Filling a glaring gap in the literature, Fuel Cell Fundamentals, Second Edition gives advanced undergraduate and beginning level graduate students an important introduction to the basic science and engineering behind fuel cell technology. Emphasizing the foundational scientific principles that apply to any fuel cell type or technology, the text provides straightforward descriptions of how fuel cells work, why they offer the potential for high efficiency, and how their unique

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Ryan O Hayre, Suk ...

Volume 1, "Fundamentals and Survey of Systems", provides the necessary background information on fuel cells, including the fundamental principles such as the thermodynamics and kinetics of fuel cell reactions, mass and heat transfer in fuel cells, and an overview of the key principles of the most important types of fuel cell, and their related systems and applications.

Handbook of Fuel Cells: Fundamentals,
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Fundamental issues that are key to fuel cell design, operational control, and material development, such as water and thermal management, dynamic operation, cold start, channel two-phase flow, and low-

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Fuel Cells: Fundamentals to Applications
is a concise source of the basic
electrochemical principles and engineering
aspects involved in the development and
commercialization of fuel cells. It describes
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with an in-depth discussion of
conventional and novel approaches
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