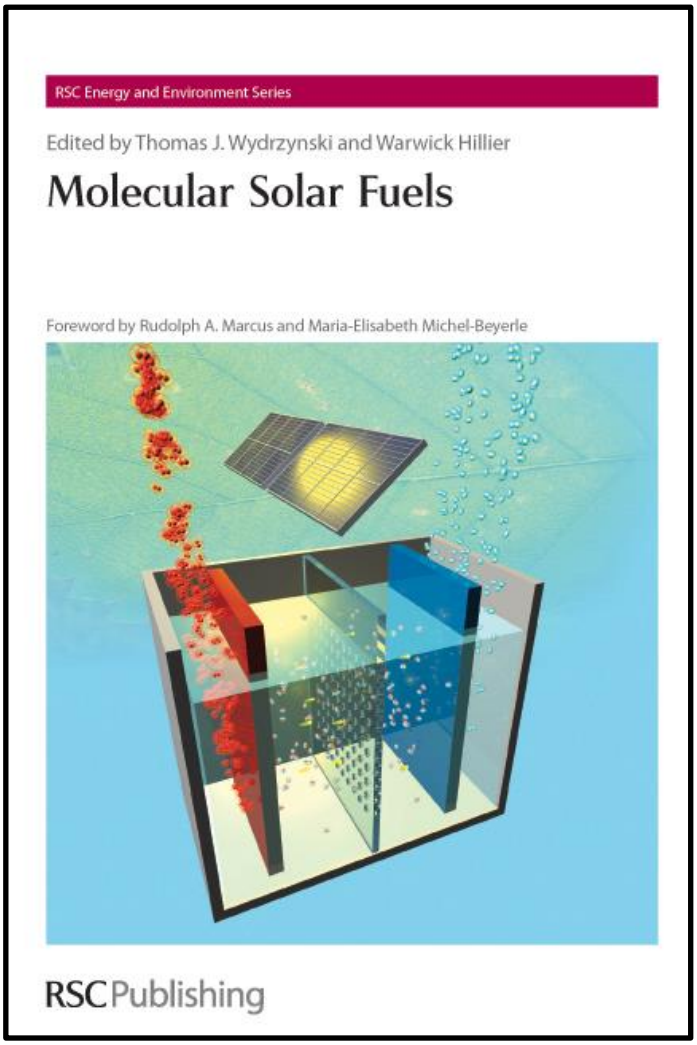

Written by experts, this book presents the latest knowledge and chemical prospects in developing hydrogen as a solar fuel.

Abstract:

Molecular Solar Fuels

World demand for energy is rapidly increasing and projections suggest energy consumption will more than double by the year 2050. The challenge we face today is how to develop carbon-neutral energy sources. Sunlight accounts for the largest energy input into the earth's surface, providing more energy in one hour (4.3 x 1020J) than all of the energy consumed by the entire planet in one year (4.1 x 1020J). If the sunlight could be captured and efficiently stored – such as in the chemical bonds of a molecular fuel – then potentially a virtually unlimited supply of clean energy would be available.

About 2.5 billion years ago, the ancestral parent to present day plants, algae and cyanobacteria evolved a method for utilizing solar energy, by catalysing the light-driven oxidation of water into molecular O2, protons and electrons. If the efficiency of this reaction were replicated industrially and the released protons were coupled to molecular H2 production, then an highly efficient fuel cycle could be achieved, where only water forms from the combustion of H2 with O2.

Alternatively, if the water oxidation reaction could be coupled to CO2 reduction, then Molecular fuels with low carbon credits, such as methanol, could be generated. In the quest for clean, energy-rich fuels, we must take advantage of natural photosynthetic and hydrogenase systems, by adapting the

energy conserving principles of nature. To achieve this goal, cutting-edge photochemical conversion technologies and breakthroughs in the understanding of natural photosynthetic and hydrogen producing systems are essential.

Molecular Solar Fuels will present recent progress in this area of research by bringing together researchers working on natural systems with those developing synthetic chemical catalysts with the central aim of creating clean, high energy fuels driven by sunlight.

Access the first chapter for free!

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