

Editorial

Introducing Advances in Hydrogen Science and Technology

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Welcome to the inaugural issue of *Advances in Hydrogen Science and Technology*. Hydrogen is expected to become a principal fuel of the future economy because it is abundant, clean, and can be used in an almost unlimited number of engineering applications. Recent advances in hydrogen science and engineering focus on improving green production efficiency, reducing reliance on rare catalyst materials, and upgrading the safety of generation, storage, and transportation systems. Scilight Press' new direct access journal aims to be not just a publication platform but also a forum that harnesses and encourages the multidisciplinary collaboration needed to advance hydrogen research and its new applications. There are several areas of research in which an innovative approach to accelerating the applications of hydrogen is required. The discovery of new methods and the improvement of existing ones for hydrogen generation, storage, and transport are of special interest for the present and expected applications.

Hydrogen production

The papers that are focused on novel aspects of hydrogen production from natural gas, from coal, via gasification, photocatalytic and biological production processes, and from electrolysis and geological hydrogen mining are of special interest. Geological (natural) hydrogen is a novel, not yet fully developed, and exciting energy resource. It is continuously produced inside the Earth's crust and upper mantle via several geochemical processes, such as serpentinization, iron oxidation, radiolysis of water, and mantle degassing. A better understanding of its generation, extraction, processing, and purification is therefore required. Nuclear reactors, in particular small modular reactors (SMRs), which are manufactured in factories and can be transported easily to a selected location, can also be optimized to produce hydrogen.

Hydrogen storage

Storage of hydrogen from clean and renewable sources is of great interest. Here we would like to invite papers that focus on the storage of hydrogen produced from sustainable energy resources such as solar, wind, and geothermal energy. Similarly, advances in methods of hydrogen storage, including solid-state materials, compressed gas, cryogenic liquid systems, and underground storage, are critical for ensuring a reliable future hydrogen supply and should be reported. Papers on various types of hydrides, metal-organic frameworks, and graphene-based storage systems for transportation applications are also invited.

Hydrogen transport

Transport of hydrogen presents various challenges related to safety and hydrogen embrittlement of structures involved in transportation. We will welcome papers that address hydrogen transport using pipeline steel and other innovative materials. Hydrogen transportation systems can also use cryogenic liquid storage and liquid organic hydrogen carriers (LOHCs). These systems are constantly evolving to address cost, efficiency, and safety concerns related to the generation of electricity and heat.

Hydrogen economy

The hydrogen economy depends on defining hydrogen applications in various engineering systems. Many applications are already implemented for transportation in various fuel cell electric vehicles, for fertilizer production, chemical manufacturing, in aerospace as rocket fuel, and in food and manufacturing industries. There



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are also several emerging applications. Both geological hydrogen and hydrogen generated using SMR nuclear reactors can be adopted in remote locations to provide energy for mining and exploration, water desalination, water purification, and to generate heat and electricity. We will be extremely interested in the papers that improve existing applications and propose new, not yet discovered hydrogen applications.

Hydrogen safety, standards, and techno-economics

Broad deployment of hydrogen will depend as much on safety, codes, and economics as on the underlying science. We therefore welcome papers on leak detection and sensing, ignition and dispersion behavior, risk assessment of refueling and storage installations, degradation and lifetime prediction of materials in hydrogen service, and the development of testing standards and certification protocols. Contributions on techno-economic and life-cycle analysis, on the carbon intensity of different production routes, and on policy and infrastructure planning are equally encouraged, as are studies that combine experiments with modeling, machine learning, and data-driven materials discovery.

Invitation to authors

Advances in Hydrogen Science and Technology publishes original research articles, critical reviews, perspectives, and short communications across the whole hydrogen value chain, from fundamental chemistry and materials science to system-level engineering and policy. All submissions receive rigorous and constructive peer review, with a commitment to rapid and transparent decisions. We invite the international hydrogen community to submit its best work to this journal and to help shape a forum in which chemists, physicists, materials scientists, and engineers can address together the challenges of a hydrogen-based economy. We look forward to your contributions.

Conflicts of Interest

The authors declare no conflict of interest.

Use of AI and AI-Assisted Technologies

No AI tools were utilized for this paper.