

Editorial

Editorial for Special Issue “Hydrogen Production and Storage”

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Hydrogen appears as an unavoidable energy vector and an almost miracle solution to global warming for many people. However, much production and storage processes are still not mature, and the sustainability and efficiency of the systems still need important research efforts.

This Special Issue on “Hydrogen production and storage” covers both production and storage in a balanced way and contains six articles, one review, and one viewpoint. Among the six articles, three are dedicated to solid materials for the hydrogen storage: the first one concerns a multiphase $\text{Ti}_{0.3}\text{V}_{0.3}\text{Mn}_{0.2}\text{Fe}_{0.1}\text{Ni}_{0.1}$ alloy synthesized by arc melting and showing a maximum hydrogen storage capacity of 1.6 wt% [1]; another one concerns sodium alanate, NaBH_4 , with its 7.4 wt% H_2 , for which the effect of nanoconfinement on the hydrogen release processes was thoroughly studied [2]. The last was on activated carbons, evaluated for their capacity to adsorb hydrogen. The best result was obtained for the sample prepared from a polymer mixture by KOH thermochemical activation with an adsorption capacity of 7.5 wt% [3]. Concerning the processes able to produce hydrogen, a first study concerns the use of biogas to feed a fuel cell and the suitable role of methanation to reduce the impact of the biogas impurities (CO) on the fuel cell [4]. The design and operation of a methanol steam microreformer is studied in another paper, with the use of a micro heat-exchanger reactor coupling combustion channels and reforming channels, allowing an almost isothermal behavior of the reactor to be obtained [5]. Finally, the catalytic production of syngas was studied using the partial oxidation of methane. The role of the catalyst preparation in the methane conversion was studied, demonstrating a particular role of mechanochemistry in the activity of catalysts [6].

The review concerns the dry reforming of methane and the design of appropriate Ni-based catalysts according to four aspects: surface regulation, oxygen defects, interfacial engineering, and structural optimization [7]. Finally, a viewpoint is presented to recall the history of the so-called LOHCs (Liquid Organic Hydrogen Carriers), which is a means to store and transport hydrogen for long distance or long periods of time [8].

In conclusion, the “Hydrogen production and storage” Special Issue underlines the growing importance of hydrogen in our society and the considerable research effort that still must be made.

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