

Bibliometric Studies on Hydrogen Storage Materials

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Hydrogen is considered a promising energy carrier due to its high energetic content and possibility of being produced from renewable sources. The need of safe and effective means of H₂ storage for energy applications remains as a scientific and technological challenge. Many hydrogen storage materials (HSM) have been investigated as candidates for stationary or mobile applications, as simple hydrides, borohydrides, metal-organic frameworks (MOFs), alanates, AB₅alloys, ammonia borane, carbon nanotubes, graphene, among others. Less attention has been paid in establishing an overview of the scientific and technological developments in HSM. In the first part of this presentation, bibliometrics and text mining approaches were used for the analysis of patent documents and also for scientific papers [1, 2]. The results show that overall HSM patenting decreased after 2007, except in the case of China. USA, Japan, China and the European Union (EU) were the main patenting territories. Simple hydrides and borohydrides were the main classes of HSM that received more attention on patenting from the USA and the EU, while Japan had a high share in solid solution alloys. Data collected from the Web of Science shows that the scientific research in HSM grew in acceleration from 2003 to 2010, and linearly afterwards. The most investigated materials were MOFs, simple hydrides and carbon-based materials. Finally, in the second part of the presentation, our efforts on the synthesis and processing of HSM based on Mg or TiFe will be presented, see e. g. [3], in perspective with the panorama build by patent and scientific literature analysis, as well as the constraints imposed for stationary systems.

[1] L. F. Chanchetti, S. M. O. Diaz, D. H. Milanez, D. R. Leiva, L. I. L. Faria, T. T. Ishikawa, *Int. J. Hydrogen Energy* 41 (2016) 18301.

[2] L. F. Chanchetti, *Scientometrics applied for hydrogen storage materials*, master dissertation, Federal University of São Carlos, 2014.

[3] J. J. Márquez, J. Soyama, R. A. Silva, D. R. Leiva, R. Floriano, T. T. Ishikawa, C. S. Kiminami, W. J. Botta, *Int. J. Hydrogen Energy* (2017) in press.
