Hydrogen economy and renewable sources exploitation: the role of membrane engineering and the competition between energy and food

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Abstract
In the last decade, a general agreement has been noticed regarding the consideration that the fossil fuels are limited and that the CO$_2$ emission and other harmful products constitute the main cause of the global warming and climate change. The common interest to deplete the fossil fuels dependence and to reduce the greenhouse gases emissions represents a top priority for both Academia and Industry. Biomass is a renewable resource useful for biodiesel and bioethanol production. In particular, bioethanol may be produced by biological processes [1]. Meanwhile, the growing attention toward the so called hydrogen economy, in which hydrogen is seen as a new energy carrier, involves a growing interest about hydrogen permeable membranes as compact devices for hydrogen generation and purification [2]. The combination of a renewable source and an alternative technology such as membrane engineering represents today a valuable option to produce hydrogen energy with respect to the conventional processes. Indeed, membrane reactors (Figure 1) represent an innovative and intensified technology for the production and the simultaneous recovery of high-grade hydrogen in only one stage. Here, the impact and the perspectives of membrane reactor technology utilization for converting biomass into high grade hydrogen via reforming reactions is described, paying also attention to the competition between food and energy in the exploitation of renewable bio-feedstocks.

Keywords: membrane reactor technology, renewable sources, hydrogen economy

References
Adolfo Iulianelli, Degree in Chemical Engineering in 2002 at University of Calabria (Italy), obtained his PhD Degree in Chemical and Materials Engineering in 2006 at University of Calabria (Italy). Nowadays, he is researcher at the Institute on Membrane Technology of the Italian National Research Council (CNR-ITM). He is author or co-author of more than 130 scientific contributions as international peer reviewed articles in ISI journals (h-index = 28, Scopus database), patent, proceedings of National and International Conferences as well as of more than 30 book chapters (peer reviewed). Furthermore, he is Reviewer of more than 30 international ISI journals, Invited and Keynote Speaker in several international conferences, training school, etc. Furthermore, A.I. was member of the Organizing Committee of several International Conferences. Editor of various scientific and international books about hydrogen, membrane technology and renewable sources, he is Associate Editor of International Journal of Membrane Science & Technology, Sectional Editor of Current Alternative Energy, Editor of Journal of Membrane Science and Technology, Advances in Chemical Engineering and Process Technology, Journal of Fuels and Scientific World Journal, Journal of Peerscientists, Material Science & Engineering Journal as well as serving as guest editor for International Journal of Hydrogen Energy.

A.I. is qualified as Associate Professor in 1) Chemical Industrial Process and Plants, 2) Systems, Methodologies & Technologies of Chemical and Process Engineering, 3) Fundamentals of Chemistry Technologies. His research interests are membrane reactors, fuel cells, gas separation, hydrogen production from reforming reactions of renewable sources exploitation.

Recent publications (2018)

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**Books (Elsevier)**


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**Contributes in proceedings (with peer reviewing)**


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