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Membrane technology for H_2 separation

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Nowadays, gas separation technologies play an important role at industrial level in a large number of chemical applications. Among them, it is worth of noting the pressure swing adsorption, temperature swing adsorption, liquid absorption and stripping, cryogenic distillation and, as emerging technology, the membrane gas separation (MGS). In most of cases, they compete each other for the same application, whereas for high product purity requirements, a combination of them should be requested. Nevertheless, the recovery and desired purity requirements and the scale operation constitute the main variables for the selection of a separation process. The operational and economic benefits and drawbacks due to the utilization of MGS technology over other gas separation processes have been largely reviewed and a growing progress has been observed in this field. Moreover, in recent years, membrane engineering has driven to significant innovations in products and processes, making membrane technologies as a valid alternative to conventional operations. Meanwhile, the application of membrane technology in the viewpoint of the Process Intensification Strategy has made possible relevant benefits in terms of high energy saving, better raw material exploitation, lower waste generation and dramatic reduction of equipment size. Among a number of potential applications in chemical processes, such polymeric membranes are particularly used in H_2/N_2 separation (ammonia synthesis process) and hydrogen recovery in refineries. However, in the last years also inorganic membrane technology has received a great attention, particularly for H_2 separation from industrial gaseous streams via Pd-based membranes. Here an application of thermal treated PEEK-WC and PLA membranes for separating H_2 from other gases of interest is presented. Furthermore, a comparison with the utilization of composite Pd-based MGS technology is given, consequently pointing out the advantages and disadvantages of both applications.

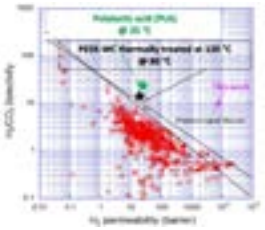

Figure1: Permeation characteristics of PLA membranes over Robeson plot - H_2/CO_2 selectivity vs H_2 permeability upper bound.

Biography

Adolfo Iulianelli has MSc Degree in Chemical Engineering in 2002 at University of Calabria (Italy), obtained his PhD in Chemical and Materials Engineering in 2006 at the same university. Nowadays, he is working at the Institute on Membrane Technology of the National Research Council of Italy (CNR-ITM). He is author and co-author of more than 120 papers, editorials and conference papers, one patent, two books and more than 20 book chapters. Furthermore, he is Reviewer of 30 international ICI journals, Invited/Keynote Speaker in more than 10 international conferences, training school, etc., Subject Editor of the *Scientific World Journal*, Guest Editor for the *International Journal of Hydrogen Energy*, Associate Editor of *International Journal of Membrane Science and Technology* and Editorial Member of other scientific journals. His research interests are Membrane reactors, Membrane technology in gas separation, Hydrogen production and reforming reactions, CO_2 capture, etc. He has been involved in various Italian (5) and European (4) projects. His h-index is 24.

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