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New versatile and accurate experimental set up to characterize membranes for gas and vapour separation processes

Gas separation, CO₂ capture, petrochemical and food industry, are only the most important fields employing membrane Gtechnologies as separation processes. The characterization of membrane materials is based on the knowledge of their permeability P and diffusivity D. Although data of P and D are available in literature for a wide group of materials, agreement between the results of the different procedures to measure them, is sometimes poor and may be material-dependent. In this work we present a new versatile experimental set up fabricated to carry out P and D measurements with high accuracy. The apparatus is a high vacuum set up allows the measurements with two methods: static and dynamic. The static method consists in a constant-volume variable-pressure procedure, dynamic one employ a mass spectrometer (MS) to perform a selective and rapidly measurements of transient flux through membranes. Both methods measure P and D. Respect to other apparatus, it present substantial improvements. It is equipped with a spinning rotor gauge, which it is possible to obtain measure with high accuracy. It has a new freestanding membrane assembly that guarantee the same feed and permeate area in order to avoid later diffusion. In the dynamic procedure MS allows to run experiment without sweeping gas to prevent sample diluition which diminishes analytical sensitivity. Finally, it allows permeability measurements in a high range of values, making it available for a wide group of materials for several applications: materials with high and very low permeability (for separation or sealing applications respectively).

Biography

Giuseppe Firpo has completed his Physics degree in 1992 from University of Genova, Department of Physics. He is the Chief of Technical Staff of Physics Department of the University of Genova. He has 39 cited documents with h-index 11 (source Scopus 2018) and he has obtained the license for teaching as Associate Professor at Italian University for scientific sector 02/B1-Experimental Physics of Matter.

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