

ABSTRACT:

Membrane Engineering in the Zero-Net CO₂ Emissions Strategy

A. Iulianelli¹

¹National Research Council – Institute on Membrane Technology (CNR-ITM),
Via P. Bucci 17C, Rende (CS), 87036, Italy.

Nowadays, membrane engineering plays a strategic role in the field of the zero-net CO₂ emissions strategy [1], as it represents an innovative approach towards the process intensification, presenting several benefits with respect to the conventional processes to generating decarbonised energy and energy carriers. Hydrogen represents one of the pillars of the aforementioned strategy [2], and the European Commission is promoting measures to create a decarbonised hydrogen energy infrastructure in Europe. According to the transition from a carbon-based to a sustainable hydrogen economy scope, the European Clean Hydrogen Alliance is then promoting research and innovative technologies acting towards the decarbonised hydrogen generation combined to the exploitation of renewable sources, such as biogas, which constitutes a greener option than the natural gas utilisation. This work aims at presenting the recent advancements and opportunities offered by the membrane engineering application to contributing to the zero-net CO₂ emissions strategy, specifically focusing on the decarbonised hydrogen generation via membrane reactor technology, and CO₂ capture and valorisation into added value products by polymeric membrane-based systems.

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[1] A. Iulianelli, E. Drioli, Membrane engineering: latest advancements in gas separation and pre-treatment processes, petrochemical industry and refinery, and future perspectives in emerging applications, Fuel Processing Technology, 206 (2020) 106464-106497