

OVERVIEW

Energy-efficient hydrogen generation and purification is needed for many clean energy applications and industrial processes. Synkera Technologies Inc. is developing novel metal/ceramic hydrogen separation membranes that target breakthrough performance and reliability in a broad range of operating conditions and offer significant cost savings at the system level. These benefits, enabled by patent-pending nanoengineered membrane composition and architecture, provide significant competitive advantages for many point-of-use hydrogen separation and purification applications.

MEMBRANES FEATURES

- Nanocomposite (metal/ceramic) active layer with permeance exceeding that of 10 μm thick Pd foil.
- Low defect density, high selectivity.
- Mechanical reliability, resistance to abrasion.
- Thermal reliability (withstands thermal cycling, resists embrittlement) and increased lifetime.
- Planar membranes of flexible size and format.
- Al rim enables reliable compression sealing.
- Significant reduction in module cost and increased reliability in comparison with Pd foils or supported films.

A detailed competitive summary is available on request.

STATUS

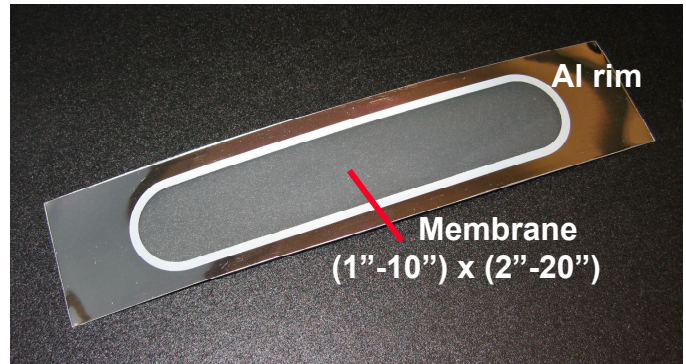
Hydrogen permeance of up to 1.5 $\text{mmol}/\text{s}/\text{m}^2/\text{Pa}^{0.5}$ at 400 °C and selectivity up to 3000 were demonstrated in laboratory prototypes. Membranes sustain repeated temperature (75 to 450°C) and pressure (0 to 100 psig) cycling in 100% hydrogen without loss of performance.

With support from NSF Phase IIB SBIR program, Synkera is scaling Gen-I membranes ($\sim 1 \text{ mmol}/\text{m}^2/\text{s}/\text{Pa}^{0.5}$) to produce prototypes sized at 30 cm^2 (2009) and 725 cm^2 (2010). Concurrently, we are validating membrane performance and reliability in select process streams (reformate, WGS, ...).

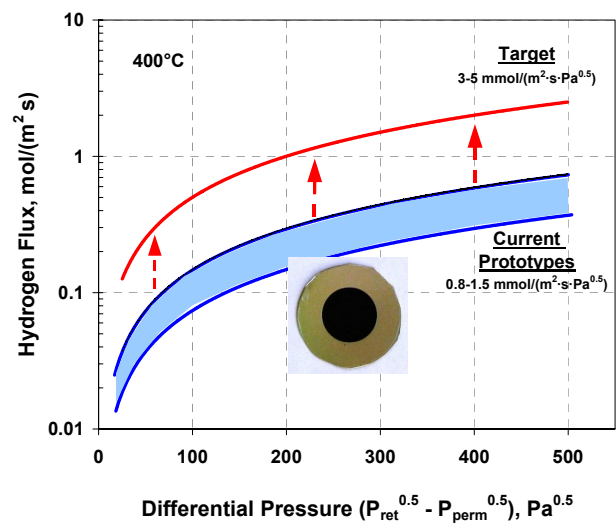
PARTNERSHIP DEVELOPMENT

Customers and partners are being sought for evaluating these membranes in new membrane systems and applications. Areas of interest include fuel cells, point-of-use and distributed purification, as well as industrial processes. To request additional information and to discuss this further, please contact:

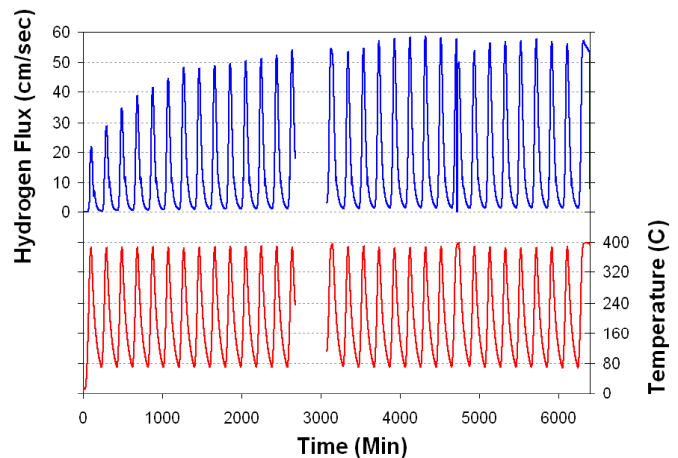
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Scaled nanocomposite membrane with Al rim.



Hydrogen flux vs. differential pressure for 1" laboratory prototype shown.



Temperature cycling performance of Synkera membrane (100% H₂, 60 psi).