SC10: "NEXT-GENERATION" MOLECULAR SIEVING NANOPOROUS CERAMIC AND CNT MEMBRANES FOR CATALYTIC GAS AND LIQUID PHASE APPLICATIONS

PILOT LINE

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Ceramic molecular sieving and template grown membranes produced by CVD.

PL OWNER

- molecular sieving nanoporous ceramic and CNT membranes system

IP OWNER

- promotes the commercialization of molecular sieving nanoporous CVD/ALD modified MS ceramic membranes

IP OWNER

- an engineering company and systems integrator focused on the process design and systems integration of the showcase

THE CONTEXT

Utilisation of CO2 as a raw material in the chemical industry for the synthesis of various chemical products offers an option for preventing several million tons of CO2 emissions each year, while increasing independence from fossil fuels. Numerous scientific publications and reports describe laboratory scale experiments in which CO2 has been successfully used as a feedstock for the synthesis of commercial chemical products.

THE CHALLENGE

To optimize and upscale the production of the "next-generation" molecular sieving and CNT membranes. Upscaling of the production of CNT membranes from 1 cm to 100 cm is very challenging. Different size templates (1 nm and >3nm), ceramic and stainless steel will be used to produce high flux templated grown SWCNT and MWCNT membranes to be deployed for high water flux water treatment processes and catalytic applications respectively. In addition, the INNOMEM the "next-generation" the nanostructure of the molecular sieving and templated grown SWCNT membranes will be tailored to remove water, shift the equilibrium in two important CO2 conversion processes (a) the CO2 hydrogenation to methanol and (b) to utilize CO2 and abundant glycerol to produce Glycerine Carbonate (GC).

KEY DRIVERS OF THE SERVICE: THE VALUE PROPOSITION

The Key Drivers of the product are the production of the molecular sieving nanoporous ALD/CVD modified MS ceramic membranes and CNT membranes by CVD and the integration of the membranes into CO2 conversion systems. The functionalities identified from the development of the membranes in this showcase are the following: High selectivity, reproducibility, uniform and high accuracy tailoring of the membrane's selective-layer nanopore size and the high water flux for the carbon nanotube membranes.