

In Showcase 1, VITO and Liqtech are working on creating grafted ceramic membranes for wastewater purification.



## PLOWNER

- IP owner of the Gringnard method for the grafting of the membranes
- Creates the grafted ceramic membranes for wastewater purification

## LIQTECH

## PARTNER

- Owner of the entire solution,
- Install the grafted membranes into existing systems for their existing customers and new customers.
- Liqtech will buy the license from VITO and become the IP owner of just the silicone carbide membranes manufacturing process and they will then do the grafting themselves

## THE CONTEXT

A recent decision by the International Maritime Organization (IMO) to enforce strict regulations on the quality of gas and water emissions has had a major impact on the shipping industry as around 70,000 ships around the world currently are unable to meet the legislation. In order to comply with the rules, the shipping industry is guided to invest heavily in solutions for cleaner air and water emissions. The contaminants from the exhaust gases of these industries can be efficiently removed using wet scrubbers by trapping and dissolving them. The scrubber systems market size is currently estimated to be at USD 927M. It is expected to rise to USD 6.103M in 202217. However, as the scrubber systems remove the polluting particles from the air, they simultaneously create heavily polluted waste- water, known as effluent, which must be treated before returning to the ocean. To treat the contaminated effluent, primarily two technologies, sedimentation / centrifugation and filtration are employed depending on effluent conditions and on the cleaning effectiveness required. Membrane filtration is a highly effective, and fast process that does not require much space. Chemically robust ceramic SiC membranes, such as those of LiqTech, have proven to be very efficient membranes, and allow also for closed-loop (no water discharge) processes. However, membrane fouling is an issue and decreases process throughput.

## THE CHALLENGE

Grafting of ceramic membranes, in order to keep membrane hydrophilicity, but decrease the interactions between membrane surface and foulants, has proven to increase their anti-fouling properties, with increased and more stable process fluxes as a result. This has been shown for grafted SiC membranes in oil/water emulsions originated from oil and gas produced water. In the INNOMEM project, grafting of SiC membranes will be tested to decrease fouling issues in the treatment of different wet scrubber effluents.

## KEY DRIVERS OF THE SERVICE: THE VALUE PROPOSITION

When benchmarking against others in the market, these grafted membranes are expected to result in a flux increase of 50%, and cleaning frequency decrease by a factor of 2. The key value brought by this product are:

### Higher Flux

- generation of more water per hour
- less membranes needed = reduced capex and opex

### Anti-fouling effect

- reduced amount of cleaning required = system will be stopped less frequently for cleaning = lower opex
- reduced amount of chemical needed for cleaning = reduced costs

### Slower degradation

- reduced amount of cleaning required = extended lifetime for each membrane