



# *polymem*

MEMBRANE MANUFACTURER



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## Presentation outlook

1. Polymem presentation
2. Polymem, your partner for membrane development and scale-up
3. Focus on two Polymem innovations in the membrane field
  - Neophil™ : new durable hydrophilic PVDF membrane
  - Gigamem® : enlargement of module size to save Capex and Opex
4. Conclusions

# Polymem

The French membrane manufacturer : Independent / Innovative / Industrial / International

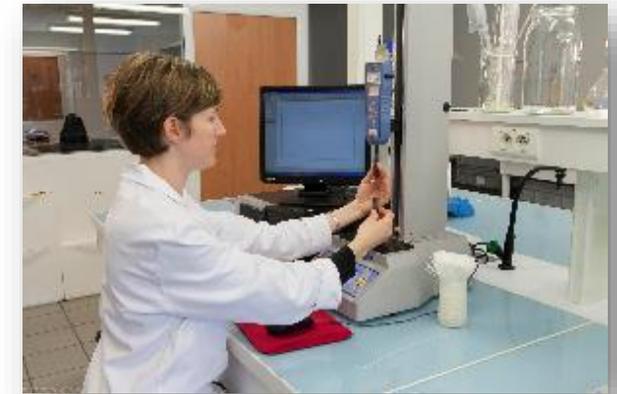
- Creation : 1997
- Location: Castanet Tolosan (Toulouse – FRANCE)
- About 60 people
- Membrane technology knowledge and expertise for water treatment applications:
  - ❖ UF/MF, PSU/PVDF material
  - ❖ Modules design
  - ❖ Process design
- Approvals: ACS since 2007 and NSF/ANSI 61 since 2004
- More than 300 installations worldwide
- Industrial partnerships
- Current developments for Gas membranes (gas separation) / Membrane contactors (CO2 capture)....



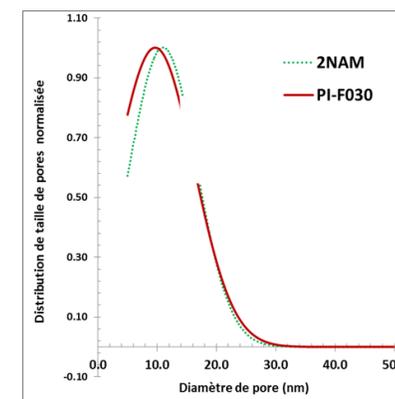
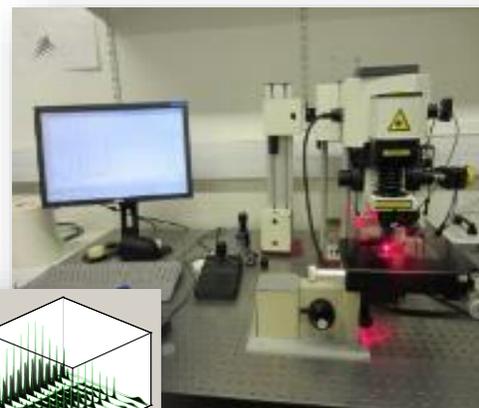
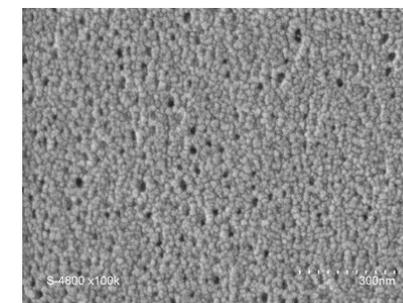
# 3. Polymem – your partner for membrane development and scale up



Our lab facilities and spinning lines



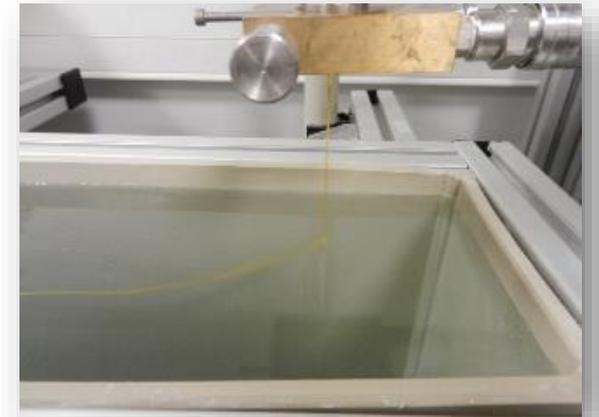
# 3. Polymem and IEM : common lab for membranes characterizations



# 3. Polymem – your partner for membrane development and scale up



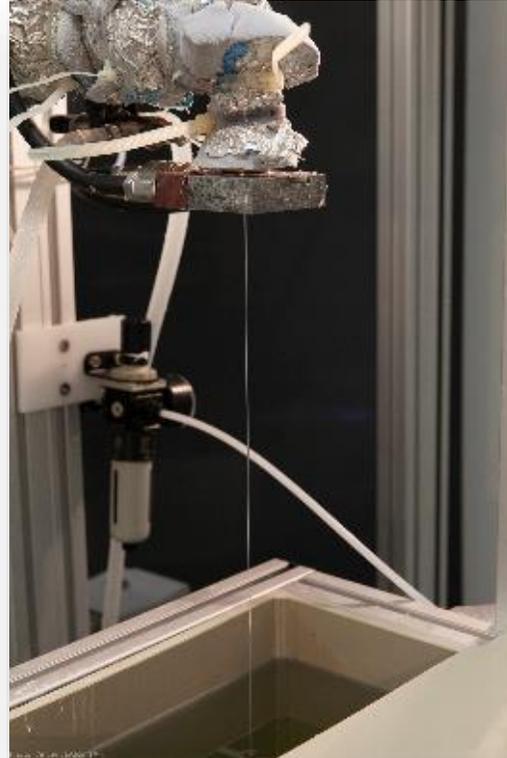
Micro spinning line for dope screening 0 to 500 g



# 3. Polymem – your partner for membrane development and scale up

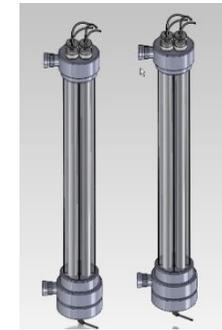
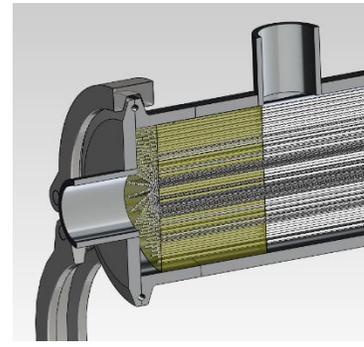
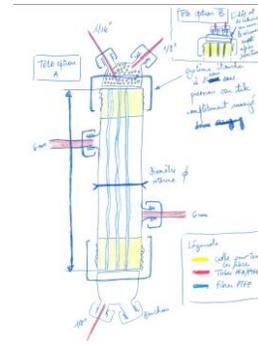


Pilot spinning line for larger production 1 to 50 kg



# 3. Polymem – your partner for membrane development and scale up

Modules design and modules manufacturing (from lab to industrial scale)



# Our R&D partners

**polymem**  
MEMBRANE MANUFACTURER



**ITM-CNR**

Istituto per la Tecnologia delle Membrane



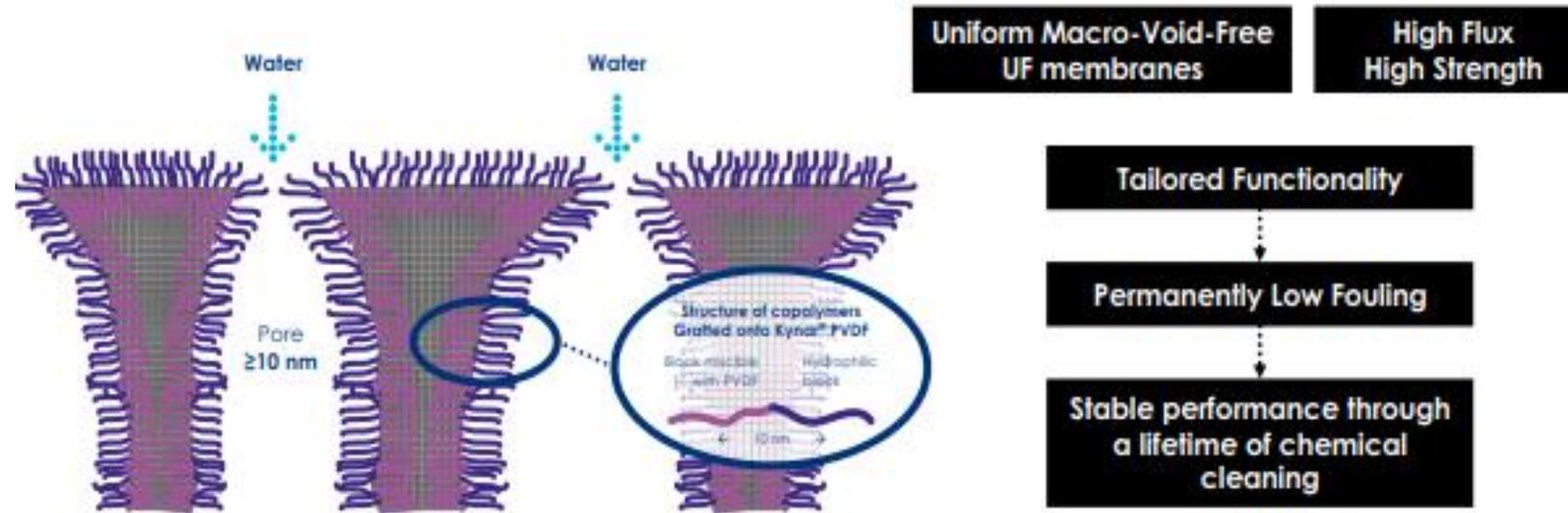


## Presentation outlook

1. Polymem presentation (video)
2. Polymem, your partner for membrane development and scale-up
3. Focus on two Polymem innovations in the membrane field
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# Neophil™ New generation of fluorinated polymer hollow fibers

Innovation = block copolymers anchored in a PVDF Kynar® matrix



Polymem, in partnership with Arkema has developed a new PVDF ultrafiltration membrane generation made from a new modified PVDF commercialized by Arkema under the Kynar® PVDF name. The modification is based on a proprietary block copolymer which provides solid and durable anchoring in the PVDF backbone as well as

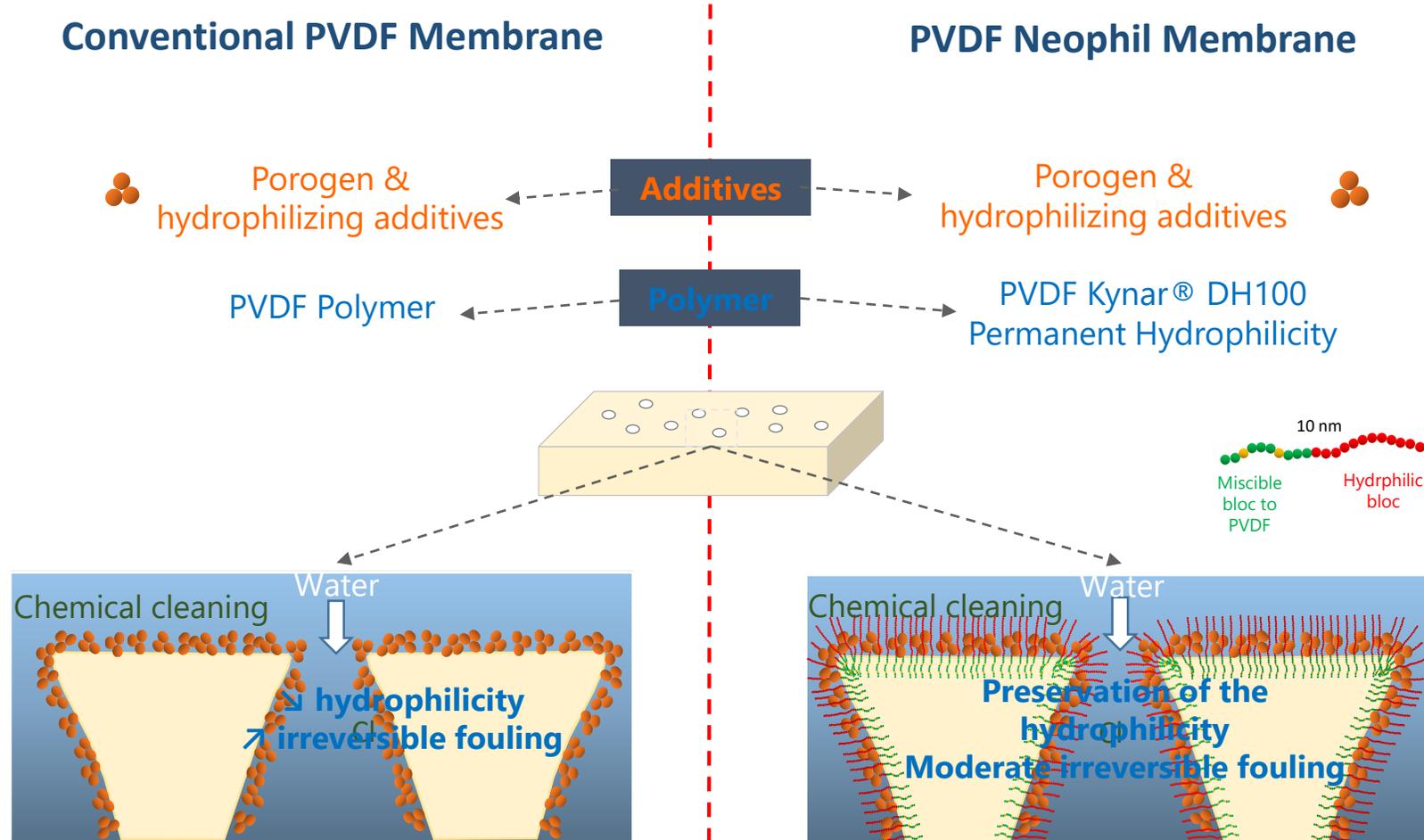
local hydrophilicity to inner and outer membrane porosity. Furthermore its strong resistance to oxidation ensures the modification to be maintained during the entire lifetime of the membrane.

# Neophil™ composition

versus conventional PVDF membranes

## Conventional PVDF Membrane

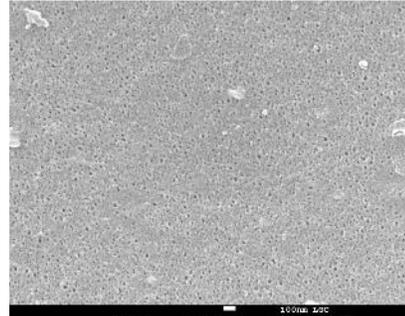
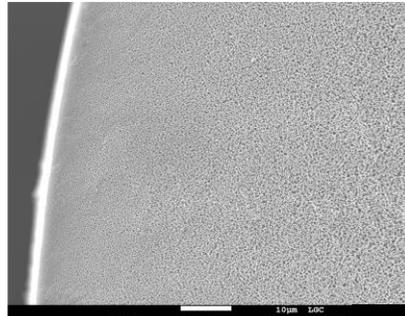
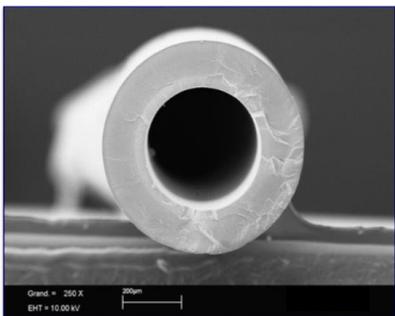
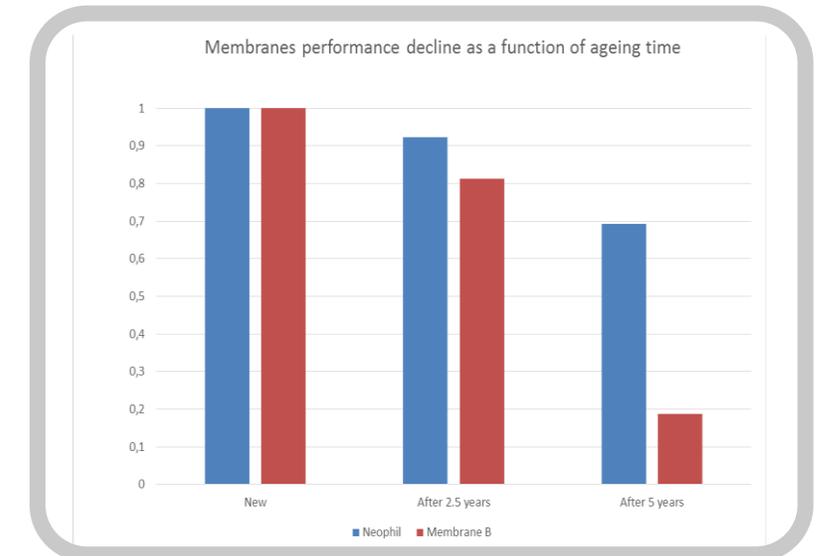
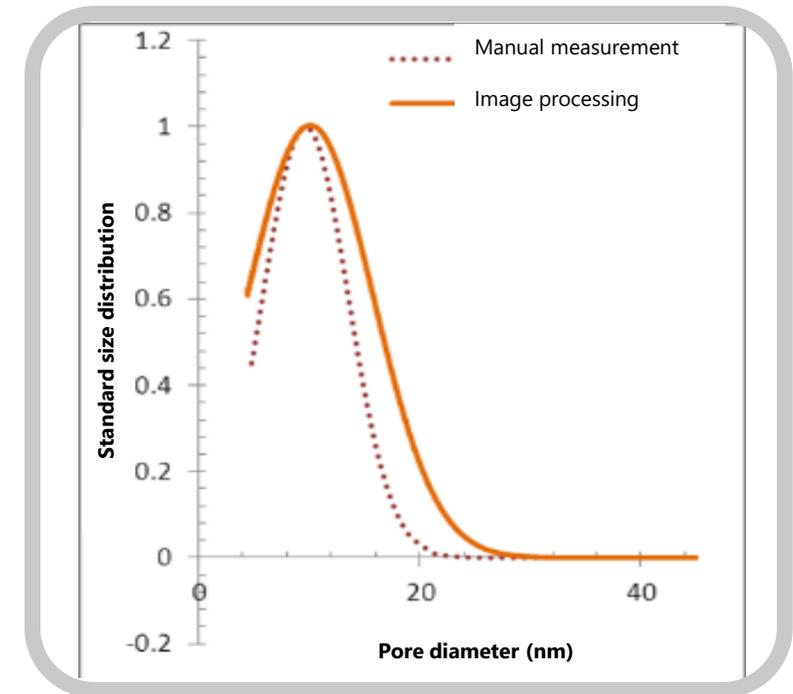
## PVDF Neophil Membrane

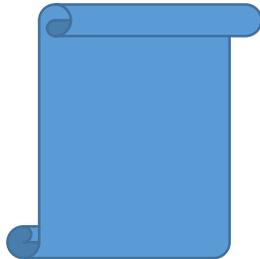


# Neophil™ permanent efficiency

constant hydrophilicity and constant removal efficiency

- Resistance to oxidants (chlorine, ozone...)
- High permeability 400 – 500 L/h.m<sup>2</sup>.bar @ 20°C
- Excellent mechanical resistance
  - Traction >6 MPa
  - Elongation at break >160 %
- Mean pore size 15 nm
- Permanent characteristics and efficiency : No loss of performance in comparison of conventional PVDF membranes
- Virus removal / MS2 Phages :
  - > 4 log on new fiber
  - AND
  - > 4 log on aged fibers
  - (exposed to 200,000 ppm.h chlorine @ pH 7)





## Poster session

P98. [547]. New hydrophilic PVDF ultrafiltration hollow fiber membrane with durable hydrophilicity for water and wastewater treatment Olivier LORAIN\*, Sébastien MARCELLINO, Maxime ZEVACO, Isabelle DUCHEMIN, Jean Michel ESPENAN \*POLYMEM, France



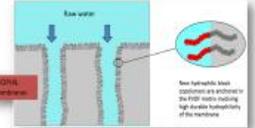
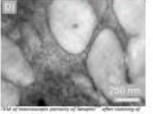

### New generation of ultrafiltration hollow fiber membrane with durable hydrophilicity for water and wastewater treatments. NEOPHIL™

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#### Introduction

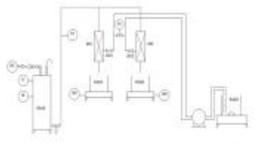
Ultrafiltration membranes for water treatment are produced mainly from polymers like PSU, PES or PVDF which have strong mechanical and chemical resistance but are hydrophobic. Membrane manufacturers modify their membranes by adding low weight molecular hydrophilic polymers but unfortunately they are not chemical resistant to oxidant and are released quickly in the early stage of the membrane plant initial operation. Polymem and his partners have developed a new durable hydrophilic PVDF membrane which is made of an alloy of PVDF Kynar® and amphiphilic nanostructured di-block copolymers.

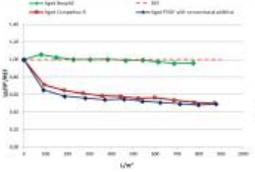



High resistance to oxidant (chlorine, ozone)  
 High permeability : 500 L/h.m<sup>2</sup>.bar@20°C  
 Mechanical resistance > 6 MPa  
 Mean pore size = 15 nm  
 Virus removal (MS2-phages) :  
 > 4 log, new fiber  
 > 4 log, fiber exposed to chlorine 200 000 ppmh, pH 7

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#### Proof of concept at lab scale on surface water (Garonne river filtration tests)

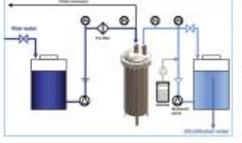


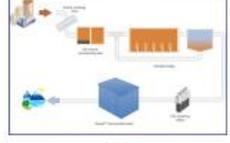


Compared to competitors and membranes made with conventional additives, Neophil™ has demonstrated superior and durable performances before and after accelerated chemical ageing. Ageing conditions = dynamic filtration, 200 000 ppmh chlorine at pH 7, no recirculation.

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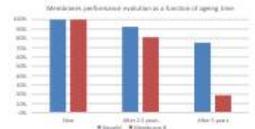
#### Large demonstration plant coupling Neophil™ with Gigamem® module design in a WWTP of 2500 pe



#### Conclusions

Neophil™ is a new durable hydrophilic membrane which has been successfully developed using nanostructured block-copolymers blended into a PVDF matrix. Industrial batches have been produced and large demonstrations are currently in progress showing remarkable benefits of this new technology for seawater, water and wastewater ultrafiltration.













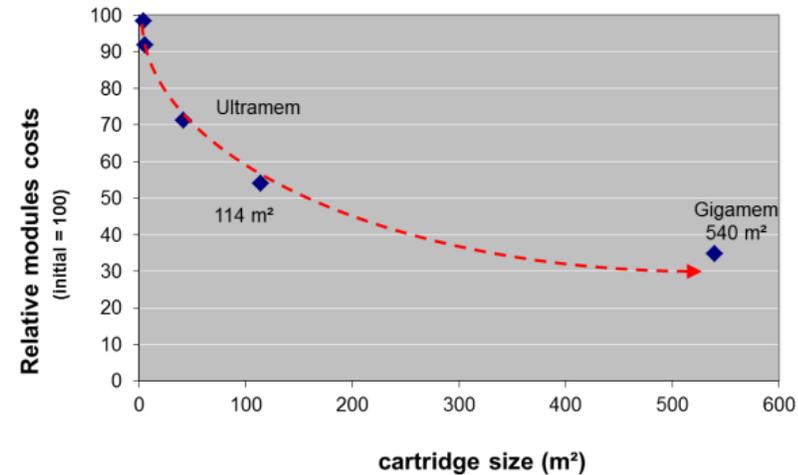
# GIGAMEM® Modules

The most compact and economic ultrafiltration module range available

- UF/MF modules sizes are standardized between 8 and 12 inches
- Huge number of modules for large plant
- Mega module : Gigamem 540 m<sup>2</sup>, 24 inches

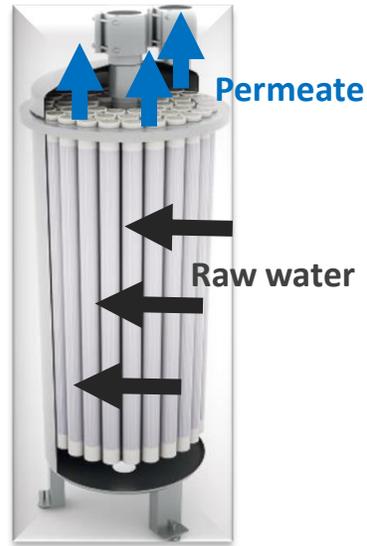
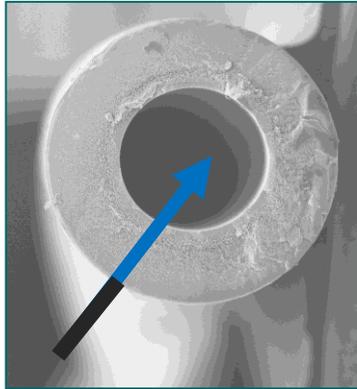


**Polymem modules**



# GIGAMEM® Modules

The most compact and economic ultrafiltration module range available



## Gigamem Out/In filtration

- Accepts high suspended solids concentrations
- Easy dead end process with reduced numbers of connections / valves
- In place maintenance (no module handling)

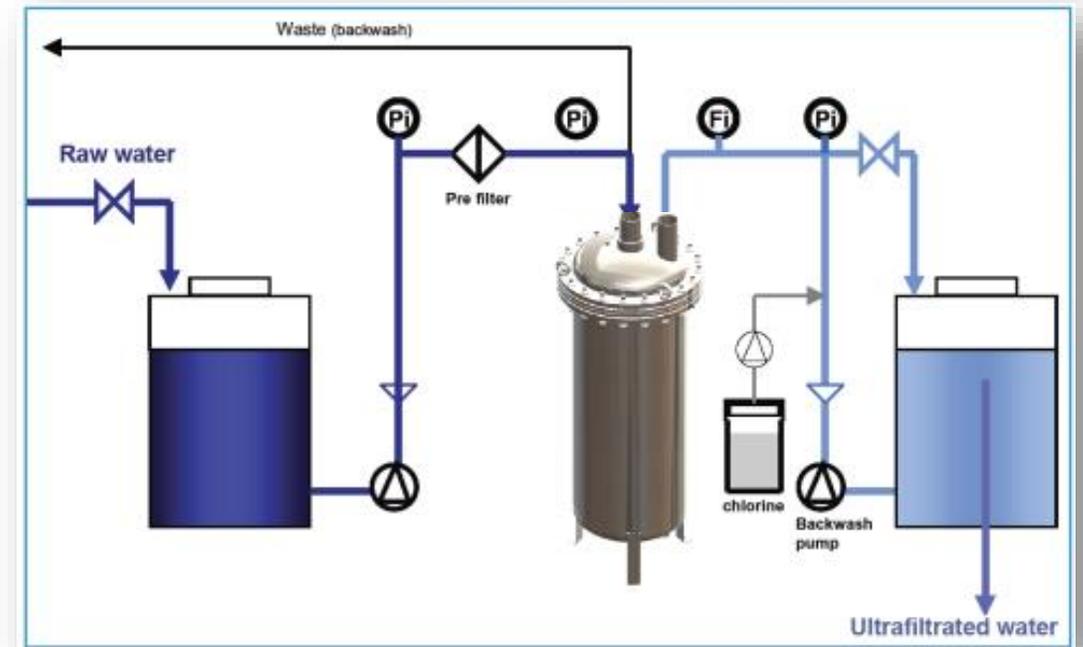
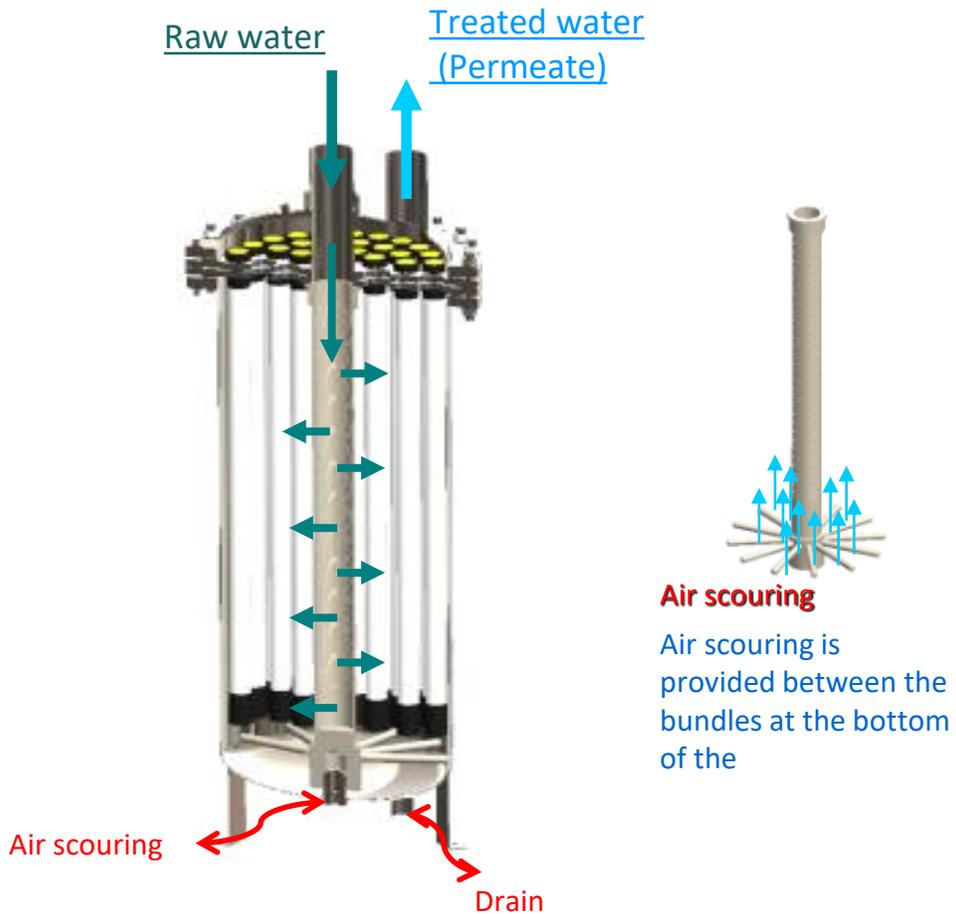


## The concept for large capacity plants

- Compacity
- Reduced maintenance & operation
- Reduced replacement cost (only the membranes)
- A vessel for each application

# GIGAMEM® Modules

The most compact and economic ultrafiltration module range available



# Polymem benefits

- to build more economic UF plants considering both
  - ☑ Capex
  - ☑ Opex
- for various applications
  - ☑ Drinking water production
  - ☑ Pretreatment of sea water before desalination
  - ☑ Waste water tertiary treatment
  - ☑ Industrial applications
  - ☑ ...



# Polymem new product developments

Ultrafiltration / microfiltration / membrane contactor / gas separation  
Cartridge development, design and manufacturing



# Thank you...

**polymem**  
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... and visit us



The 9<sup>th</sup> International Water Association (IWA)  
Membrane Technology Conference  
& Exhibition for Water and  
Wastewater Treatment and Reuse

