

# INPHAZE *FOULING* MONITOR

*Detects fouling problems earlier!*



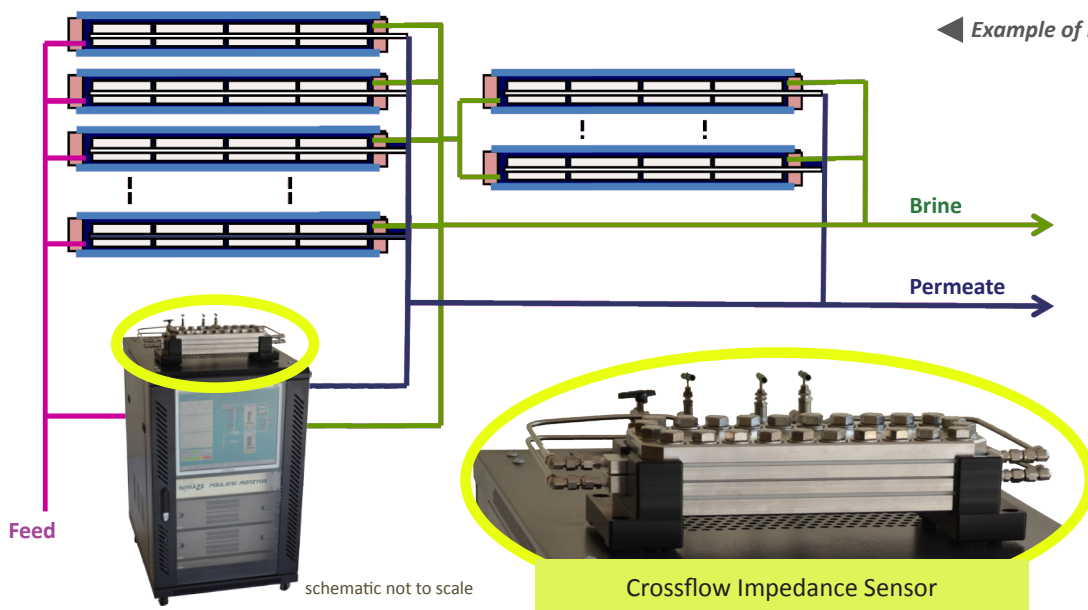
The INPHAZE Fouling Monitor is a new tool for on-line detection of fouling in membrane plants. It is suitable for all types of membrane systems, including micro-filtration (MF), ultra-filtration (UF), nano-filtration (NF), reverse-osmosis (RO) and forward-osmosis (FO).

The Monitor is a portable device connected to a side stream in parallel to the operating membrane modules. It acts like a canary in an old coal mine, to alert plant operators of fouling before this becomes a problem.

Installation of the Fouling Monitor is easy and causes minimal disruption to existing plant operations.

- ✓ Optimised plant performance
- ✓ Reduced power consumption
- ✓ More efficient cleaning cycles
- ✓ On-line monitoring of membrane cleaning
- ✓ Extended lifetime of membranes
- ✓ Reduced plant downtime



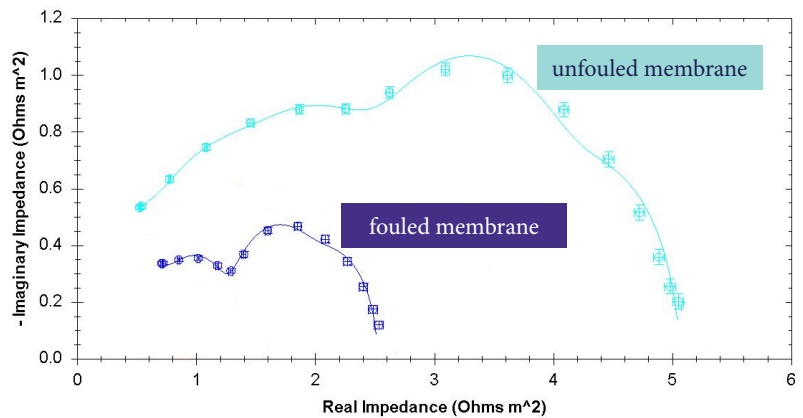


The Fouling Monitor is connected to a side stream in parallel to the main membrane modules. The heart of the Monitor is the **Crossflow Impedance Sensor** which contains a membrane sample identical to the membranes of the plant. The electrical properties of the membrane in the Impedance Sensor are measured continuously, using INPHAZE's patented, high-resolution Electrical Impedance Spectroscopy (EIS).

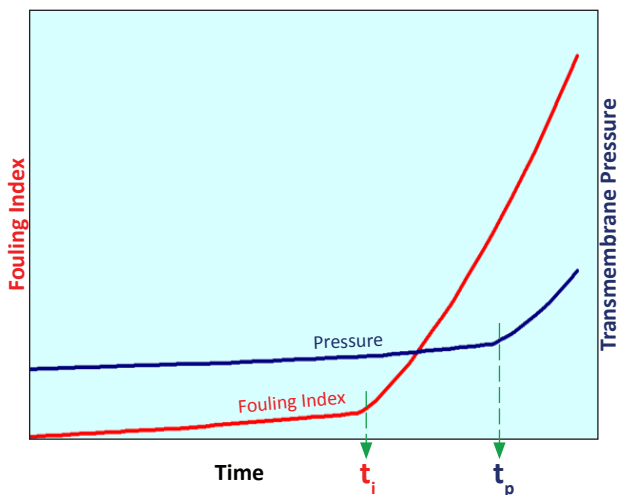
The ultra high resolution of the INPHAZE system allows fouling of the membrane in the Impedance Sensor to be detected as soon as the initial molecular films are deposited on its membrane surface. Thereby the INPHAZE Fouling Monitor gives a quantitative warning of the fouling processes as they occur in the operating membrane modules of the plant.

Typical EIS signatures of unfouled and fouled membranes are shown on the right. The pattern is characteristic for the type of foulant and the extent of fouling. ▶

The **Fouling Index** is derived from the EIS data to indicate to plant operators the relative level of fouling in their main membrane modules. ▼



**Typical EIS signatures of unfouled and fouled membranes**  
A unique EIS fingerprint is used to determine the type of foulant and the extent of fouling or scaling.



**Fouling Index and Transmembrane Pressure vs Time**  
The Fouling Index indicates signs of fouling at time  $t_i$ , which is ahead of the rise at time  $t_p$  of the transmembrane pressure applied to maintain constant flux.

#### Evaluation trials:



Singapore Membrane Technology Centre (SMTc)  
Nanyang Technological University  
Singapore



UNESCO Centre for Membrane Science and Technology  
University of New South Wales  
Australia



School of Chemical and Biomolecular Engineering  
University of Sydney  
Australia

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