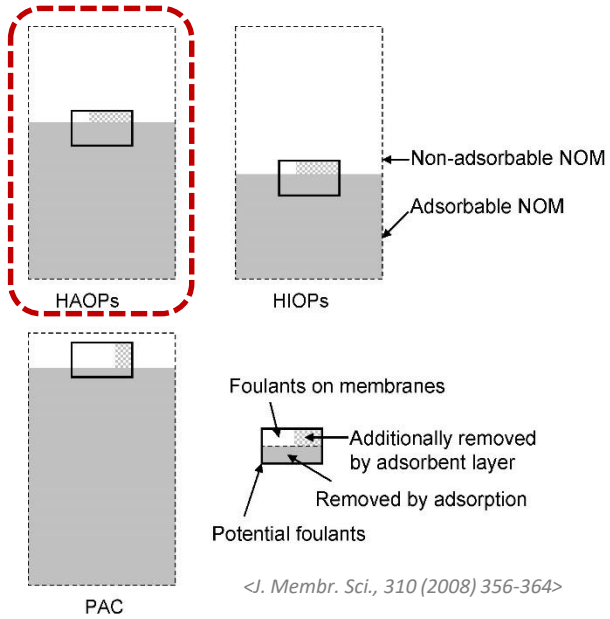
NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

Singapore Membrane Technology Centre
Nanyang Environment and Water Research Institute

# SUPPORTING MODULE DESIGN, FABRICATION AND OPERATION TO HARNESS THE BENEFITS OF HAOPs (HEATED ALUMINUM OXIDE PARTICLES) FOR FOULING CONTROL AS A NOVEL PRETREATMENT IN PRACTICAL MEMBRANE-BASED WATER PROCESSES

Heated aluminium oxide particles (HAOPs) as a metal oxide adsorbent, have been shown to be effective in removing natural organic matter (NOM) and particulate matter, thus subsequently reduce downstream membrane fouling. This study will examine the phenomenon through the design, fabrication and operation of an appropriate HAOPs supporting module. The final goal of this project is to scale up the HAOPs module to treat 5m$^3$ feed water (the real MBR effluent) per day, paving the way for commercialisation of HAOPs technology.

## Removal of NOM Vs. actual foulants

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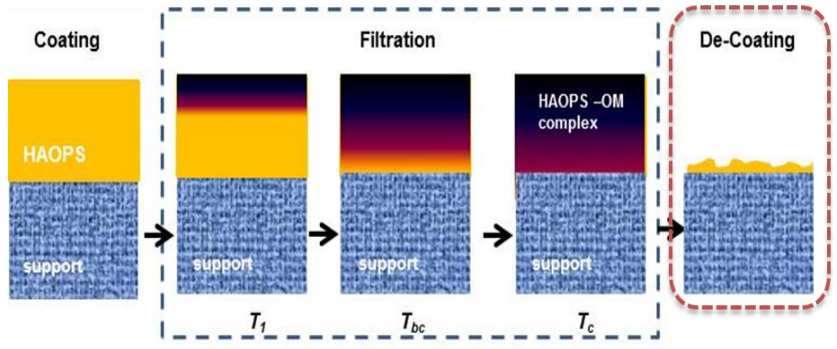
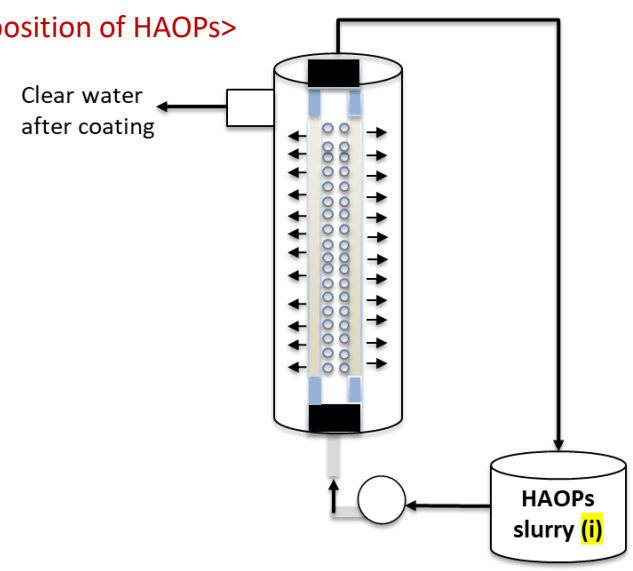
## Continuous cycle of coating, filtration and de-coating using HAOPs process

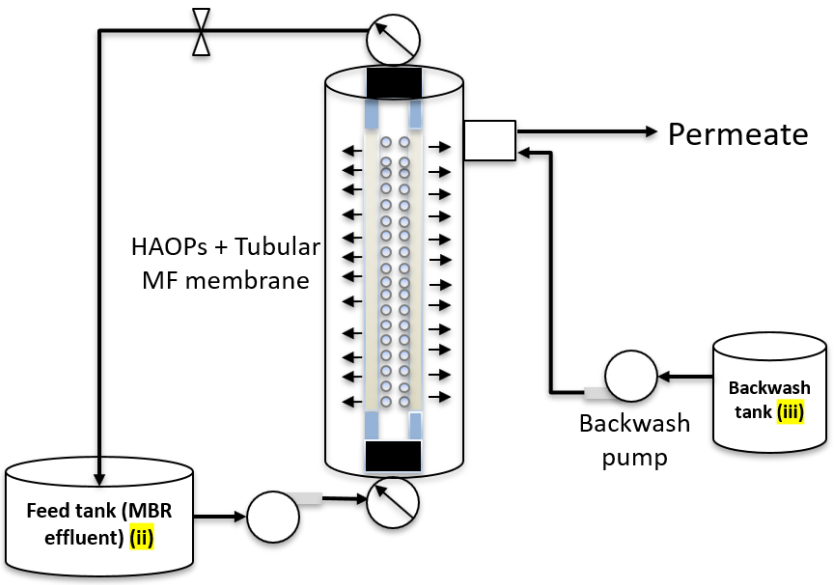



$T_c$ is a critical duration of the filtration at which the de-coating becomes imperative (as indicated by the higher pressure required to operate the subsequent treatment cycle).

## A 3-step cycle of the HAOPs process: (i) Deposition of HAOPs layer, (ii) filtration of feed water and (iii) de-coating of the HAOPs layer.

<Deposition of HAOPs>




<Filtration of feed water and de-coating of the HAOPs layer>

Collaborator: MicroHAOPs, Inc., USA

**For more information · Email: RWang@ntu.edu.sg (Prof. Wang Rong) · SMTC website: http://smtc.ntu.edu.sg**