



Self-Adaptive Control And Optimization Of Ultrafiltration

Tech ID: 27243 / UC Case 2016-159-0

SUMMARY

UCLA researchers in the Department of Chemical and Biomolecular engineering have developed a novel UF-RO system.

BACKGROUND

Ultrafiltration (UF) is the process of membrane-based removal of particles. It is used in a number of different industries such as food production, water treatment, desalination etc. In particular, in water treatment plants it is used as the first step before further treatment by reverse-osmosis (RO). The main drawback of current UF-RO plants are the need for backwashing at fixed intervals to clean the UF membrane and a separate tank to be used for backwashing. Together these issues add to recurrent maintenance costs.

INNOVATION

UCLA researchers have developed a novel UF-RO system that overcomes the drawbacks of current systems. They have developed an integrated UF-RO system that is self-adaptive. The UF membrane is continuously monitored for resistance and backwashing is automatically initiated upon reaching a threshold. The system uses the RO permeate and does not require a separate storage unit reducing operational and maintenance costs. In a field test for desalination the system improved the membrane performance from 16 to 143 days.

APPLICATIONS

- ▶ Potable water treatment
- ▶ Waste water treatment
- ▶ Food industry
- ▶ Desalination

ADVANTAGES

- ▶ Real-time monitoring of membrane resistance using pressure and flow sensors.
- ▶ Automated backwashing upon reaching resistance threshold.
- ▶ Reduced maintenance cost
- ▶ xtended UF membrane performance from 16 to 143 days.
- ▶ Compatible with RO, microfiltration and nanofiltration uses.

STATE OF DEVELOPMENT

Prototype developed and extensively tested in a field study

RELATED MATERIALS

- ▶ [Larry X. Gao, Anditya Rahardianto, Han Gu, Panagiotis D. Christofides, Yoram Cohen ‘Novel design and operational control of integrated ultrafiltration — Reverse osmosis system with RO concentrate backwash’ Desalination 2015](#)

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,576,428	03/03/2020	2016-159

CONTACT

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Reverse osmosis, Desalination,

Seawater desalination, Ultrafiltration,

Process control, Pulse backwash, RO

concentrate backwash, UF–RO

integration, Real-time monitor,

Membrane resistance, Self-adaptive,

Backwash control, Continuous

backwash

CATEGORIZED AS

- ▶ [Biotechnology](#)
 - ▶ [Industrial/ Energy](#)
- ▶ [Engineering](#)
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RELATED CASES

2016-159-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [System and Method for Flexible Low-Energy Membrane-Based Liquid Purification](#)
- ▶ [A Novel Ex-situ Scale Observation Detector \(exsod\) for Mineral Scale Characterization and Online RO Process Monitoring](#)
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