הטכניון - מכון טכנולוגי לישראל

TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY

הפקולטה להנדסה כימית
ע"ש וולפסון
The Wolfson Department of Chemical Engineering

Wolfson Department of Chemical Engineering Special Seminar

Lecture Hall 6, Wolfson Department of Chemical Engineering,

November 23rd 2016, at 13:30

Dr. Xianhui Li

Advisor: Prof. Raphael Semiat & Prof. Emeritus David Hasson

Study of scale control and mechanism in desalination process

Scale deposition is a difficulty encountered with water containing ions of sparingly soluble salts such as $CaCO_3$ and $CaSO_4$ and is one of the obstacles hampering the further progress of both thermal and membrane desalination processes. Harmful effects arising from the formation of scale layer are flux reduction due to increased flow resistance, augmented energy consumption, periodic cleaning requirements and membrane life shortening. Techniques for preventing scaling rely on modification of the process conditions such as temperature, flow velocity, pH or by removing the scale-forming compounds from the treated water. A common method for controlling scale formation in desalination practice is by the use of anti-scalants.

To assess the effectiveness of anti-scalants for suppressing scale deposition in thermal desalination process, a novel technique was applied. This method was based on identifying the threshold concentration at which scale deposition is unaffected by transport hydrodynamics and is purely surface controlled. Results showed that the technique enabled unambiguous classification of the relative effectiveness of the tested anti-scalants. To further characterize the scale inception phenomena in membrane desalination process, a simultaneous dual measurement of the flux decline and frictional pressure drop in an annular RO system was conducted. The experimental data was coupled with a single parameter model defining that the membrane scale coverage occurred by the gradual lateral growth of crystals around from nucleation sites. Finally, the effects of supersaturation levels and flow conditions on the induction period were investigated so as to elucidate the incipient $CaSO_4$ precipitation mechanism on membrane surface.

Refreshments will be served at 13:15