UNDER THE AUSPICES OF H.E. THE PRESIDENT OF THE HELLENIC REPUBLIC MR. PROKOPIOS PAVLOPOULOS

17TH INTERNATIONAL CONFERENCE ON CHEMISTRY AND THE ENVIRONMENT

16-20 June, 2019, Thessaloniki, Greece

ICCE 2019 PLENARY SPEAKER

Professor **Mathias Ernst**
Technical University of Hamburg, Germany

"Cons and Pros of NOM presence in the operation of membrane separation processes"

The presence of natural organic matter (NOM) in feed waters of membrane processes usually is considered as a treatment challenge with respect to organic fouling and final product quality. In low pressure porous systems organic fouling may be controlled e.g. by a combination of coagulation, adsorption or oxidation prior to the membrane filtration. Such "membrane hybrid systems" are effective as they can easily be backwashed; however cleaning efficiency depends also on the quality and character of NOM present. Large organic molecules like biopolymers or humic substance are extremely relevant for fouling, where as smaller NOM fractions might even end up in the product water. In the present study we show that NOM presence might also have positive effects on the overall performance of membrane processes. Reverse osmosis (RO) desalination of brackish water and seawater has been increasingly applied to augment water supplies in regions where freshwater is scarce or polluted. However, a serious limitation during RO desalination at high water recovery is membrane scaling due to the concentration and subsequent crystallization of sparingly soluble salts in the feed water stream (bulk crystallization) or directly on the membrane surface (surface crystallization). As a consequence at higher membrane yields, the dosage of antiscalentsis required. Although inhibition of gypsum scaling by a commercial phosphonic and polyacrylic acid-based antiscalant was considerably stronger, the study demonstrate that NOM is an effective natural antiscalant. The paper will focus on the various boundaries of gypsum scaling in bulk and surface crystallisation of reverse osmosis and the interaction of terrestrial as well as aquatic NOM during this process. It suggests that NOM-supported scale inhibition can be considered as an alternative measure for scale control during membrane-based desalination of natural waters. Primarily seen as problematic fouling compounds the results reveal that certain NOM qualities may show beneficial effects in membrane operation.

EuChemS
European Chemical Society
Division of Chemistry and the Environment