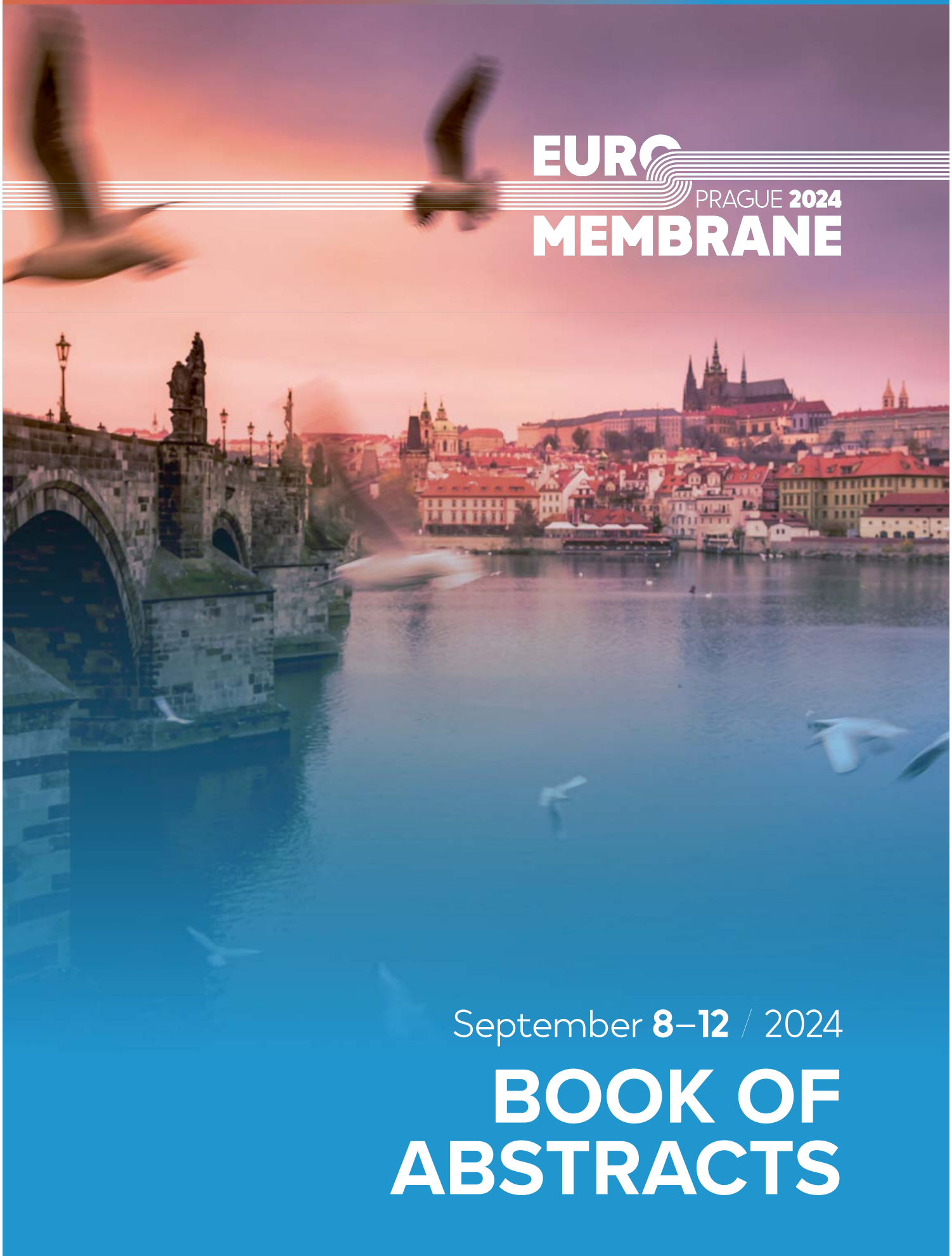

September **8**–**12** / 2024

BOOK OF ABSTRACTS

ORGANIZER

Main organizer

European Membrane Society

EMS 1982

Local organizer

CZEMP, The Czech Membrane Platform

CZEMP

The conference is held under the auspices of Liberec region and under the auspices of Confederation of Industry of the Czech Republic

Liberecký kraj

SVAZ PRŮMYSLU A DOPRAVY ČESKÉ REPUBLIKY

Scientific committee

Luboš Novák
Honorary Chairman
MEGA, Czechia

Enrico Drioli
Honorary Chairman
Emeritus professor at the University of Calabria, Italy

Pavel Izák
Head of Scientific Committee
Institute of Chemical Process Fundamentals of the Czech Academy of Sciences / University of Chemistry and Technology Prague, Czechia

Reverse osmosis membrane efficiency in removal of PFAS

Jelena Šurlan[1*], Zita Šereš[1], Nikola Maravić[1], Nataša Đurišić Mladenović[1], Carla Brazinha[2], Claudia F. Galinha[2], Igor Antić[1], Jelena Živančev[1], João G. Crespo[2]

[1]*University of Novi Sad, Faculty of Technology Novi Sad, Bul. cara Lazara 1, 21000 Novi Sad, Serbia*
[2]*LAQV-REQUIMTE, Department of Chemistry, NOVA School of Science and Technology, FCT NOVA, Universidade NOVA de Lisboa, Caparica 2829-516, Portugal*
[*]*jelena.surlan@uns.ac.rs*

Keywords: reverse osmosis, PFAS, water treatment

Introduction. Per- and polyfluoroalkyl substances substrances (PFAS) comprise of over 4000 artificially manufactured compounds with widescale consumer and industrial applications[1]. Due to their extensive use, PFAS are often detected in the aquatic environment and represent a global concern due to their persistence, adverse effects on living organisms and bioaccumulative potential. Conventional water treatments are insufficient in the removal of PFAS and, therefore, additional treatment methods are often required[2]. Advanced processes, such as nanofiltration and reverse osmosis, are considered to be extremely effective in removal of various emerging contaminants, including PFAS[3]. This study reports the efficiency of reverse osmosis membrane in removal of selected PFAS compouds from model water samples.

Experimental/methodology. Commercially available polyamide reverse osmosis membrane, SW30HR (Filmtec, USA), was used for removal of three PFAS compounds: perfluorobutanoic acid (PFBA), perfluorobutane sulfonate (PFBS) and perfluorooctane sulfonate (PFOS). Reverse osmosis experiments were conducted in METcell® dead-end unit (EVONIK, Germany). High pressure nitrogen gas cylinder was used for obtaining 30 bar pressure in the system. Ultrapure (Milli Q) water was used for feed preparation and the solution was spiked with 0.3 ng/mL of each selected PFAS. Initial sample volume (feed) was 200 mL and the experiment continued until 100 mL of permeate was collected. Temperature of the spiked solution was set at 25 °C and pH value was set at 7.

Results and discussion. Obtained results are presented in Figure 1. Rejections above 80% were achieved for all selected PFAS with the SW30HR membrane. An increase in rejection was observed with an increase in molecular weight (MW) of selected PFAS. The lowest rejection could be observed for PFBA (MW = 214.04 Da), while significantly higher rejections were observed for PFBS (MW = 300.01 Da) and PFOS (MW = 500.13 Da). Due to the low molecular weight cut off (MWCO = 100 Da) of the reverse osmosis membrane, high rejections of PFBA, PFBS and PFOS were expected. However, despite low MWCO, presence of selected compounds in the permeate suggests influence of other factors on PFAS rejection, such as PFAS molecular length, width, pKa and logKow values.

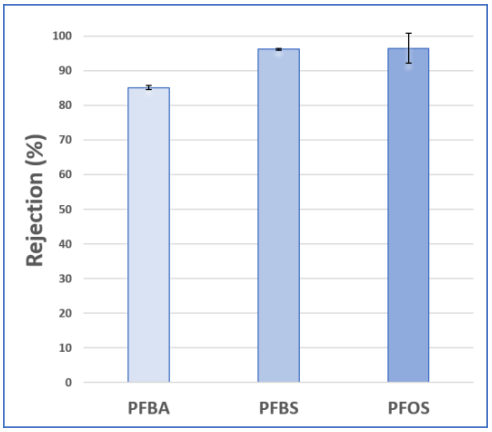

Figure 1 Rejection of selected PFAS by reverse osmosis membrane

Acknowledgments
Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or EU executive agency. Neither the European Union nor the granting authority can be held responsible for them. This work is conducted under the project TwiNSol-CECs that has received funding from Horizon Europe programme under grant agreement no.101059867.

References

[1] Lenka, S. P., Kah, M., & Padhye, L. P. *Water research*, **2021**, 199, 117187.
[2] Pan, C. G., Liu, Y. S., & Ying, G. G. *Water research*, **2016**, 106, 562-570.
[3] Xiong, J., Hou, Y., Wang, J., Liu, Z., Qu, Y., Li, Z., & Wang, X. *Environmental Science: Water Research & Technology*, **2021**, 7(11), 1928-1943.