

REPORT

Installation of a new dead-end system (METcell®) at Faculty of Technology Novi Sad (TFNS) for TwINSol-CECs research on nanofiltration in CECs removal from water

Upgrade of the existing membrane systems at TFNS was planned within the TwINSol-CECs project and the Work Package (WP) 3 - Reinforcing research knowledge and skills of TFNS, but also to be capable to perform the research planned within WP4. The upgrade has been agreed in accordance with the suggestion of Prof. Joao Crespo, a leading investigator from the project partner institution, NOVA University of Lisbon (UNL), given in the very beginning of the project during the online meetings. Prof. Crespo suggested that upgrade of the existing equipment of TFNS with similar or the same unit as the one existing at UNL would enable improvement of the TFNS technical abilities to conduct high-pressure driven processes such as reverse osmosis or nanofiltration of water samples, also harmonized with the research capacities at UNL. The chance for TFNS representatives to learn more about METcell® dead-end system and its applicability in CECs research was during the visit to UNL during December 2023, when training on putting the device into operation was conducted on the existing unit at UNL.

The METcell® set of equipment was designed by EVONIK company to be an easy entry point for scoping separations process development at lab scale, using flat sheet membranes. Upon receiving the METcell® at the Lab, the installation and training session were agreed with the official distributor for Europe (m-PS Modular Process Solutions, Switzerland) and organized online on April 3rd, 2023.

The METcell® is a 316 stainless steel high-pressure stirred cell that is capable of performing a wide range of membrane separations. It has a maximum working pressure of 69 bar and is suitable for reverse osmosis and nanofiltration separations using aqueous and non-aqueous solvents. O-ring seals are used to allow high-pressure operation. The METcell® is pressurized using gas from a cylinder (typically using an inert gas such as nitrogen) and with the MET Gas Unit supplied with each METcell®.

Through the application of METcell® dead-end system in lab scale nanofiltration experiments, TFNS will be able to effectively test multiple membrane materials, filtration processing conditions and different size exclusion parameters (membrane pore size, MWCO, etc). METcell® provides easy-to-use design, with easily removable top to charge feed solution, and easily removable base for membrane replacement which allows great reproducibility of tested operating and processing conditions.

So far, METcell® has been used in state-of-the-art nanofiltration research published in the high rank membrane science journals by multiple authors.

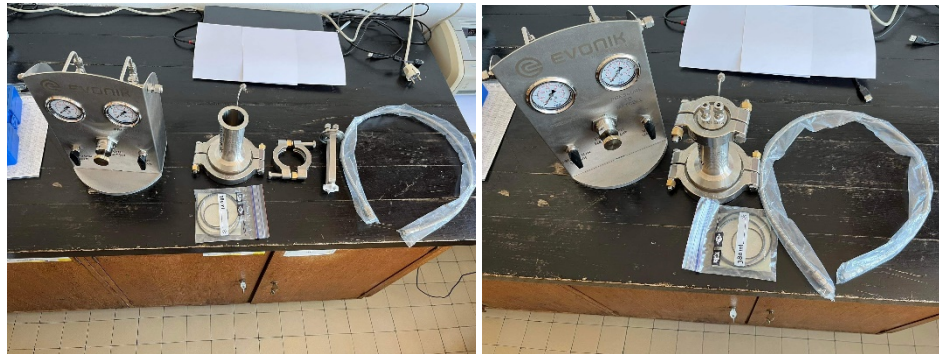


Figure 1. METcell® dead-end system components

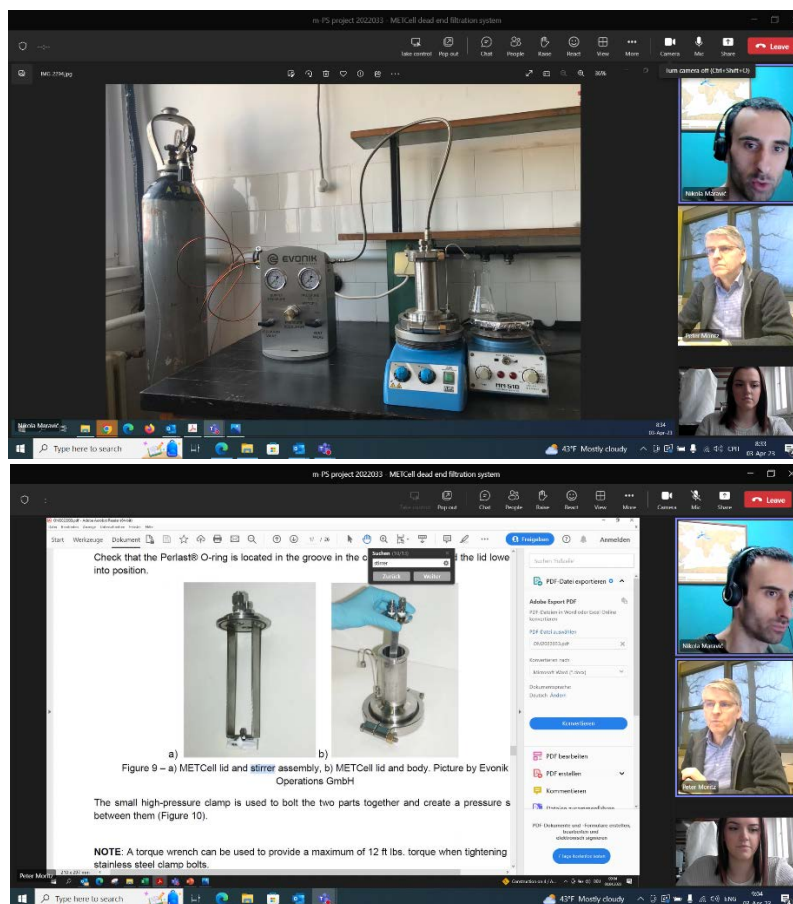


Figure 2.. Online training session with Peter Moritz from m-PS Modular Process Solutions (Switzerland)

The METcell® was successfully installed at TFNS (Figures 1-2) by Dr. Nikola Maravić and Jelena Šurlan, PhD student, as a members of nanofiltration research team within TwiNSol-CECs project, under the supervision of Peter Moritz, Managing Director of m-PS modular process solutions (Allschwil, Switzerland).



Figure 3. *Setting up METcell® dead-end filtration unit in TFNS laboratory*



Figure 4. *METcell® dead-end filtration unit installed at the TFNS laboratory labeled with TwiNSol-CECs sticker*

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