

## REPORT

### 3<sup>rd</sup> TwiNSol-CECs training

#### “Transfer of knowledge and best practice for TwiNSol-CECs research and strategic activities”

NOVA University of Lisbon, Lisbon, Portugal

December 12-16, 2022

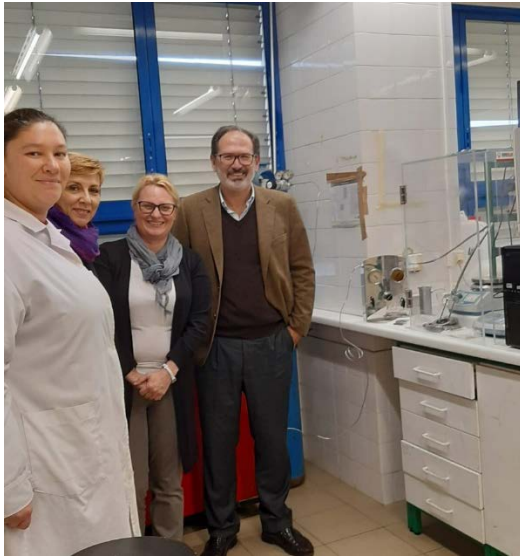
3<sup>rd</sup> TwiNSol-CECs training was organized at UNL by Prof. Joao Crespo in the period December 12-16, 2022 in accordance with the agenda attached to the Report. It was an event dedicated to intensive transfer of advanced knowledge and best practice of UNL staff to representatives of TFNS: Prof. Nataša Đurišić-Mladenović, Prof. Zita Šereš, and Dr. Nikola Maravić. Every day of the training was dedicated to particular subjects of importance either for the joint research at TwiNSol-CECs (within WP4) or for creation of the research management and administration unit (RMAU, WP5). This was also a chance to organize a working meeting dedicated to the planning of the joint project activities in 2023.

Prof. Crespo organized and led the meetings with:

- researchers from NOVA School of Science and Technology (FCT) and Institute of Experimental Biology and Technology (iBET),
- representatives of IRIS (Innovation Research and Impact Strategy) Office at FCT, responsible for support to the researchers for projects preparation at FCT,
- staff of the NOVA University Doctoral School.

All these meetings within the 3<sup>rd</sup> TwiNSol-CECs training enabled for TFNS team members to be more familiar with advanced research and equipment, as well as institutional management and administration efforts at UNL, that have contributed to placing UNL at high ranking positions within ERA and among European higher education institutions.

During the first day of training, December 12, 2022, TFNS representatives were introduced into the operation of METCell and Osmonics installation at FCT by Mafalda Cadima and Veronica Lee. The team from TFNS participated in laboratory training on the dead-end membrane filtration METCell device, where the greatest attention was paid to putting the device into operation, considering that the team from TFNS is in the process of purchasing the METCell equipment. The TFNS team also received recommendations on types of polymer membranes, which can be used for nanofiltration, on the most appropriate materials they are made of, how to store the used membranes, and how to clean the membranes. The team learned how to perform experiments on the METCell device. The team participated also in a complete laboratory exercise on a cross-flow Osmonics installation, from putting it into operation until the end of the experiment. In this case, great emphasis was placed on the configuration of the flat sheet membrane module in order to carry on the cross flow nanofiltration.



*Presentation of METCell and Osmonics installations at FCT*

In the afternoon, Prof. Crespo organized three 1-hour training sessions on advanced topics within which he and his research team members at FCT obtained important results within membrane-based studies. Dr. Claudia Galinha presented machine learning application in research of membrane separation as a useful tool for exploring hidden patterns in data sets with different variables measured during the separation experiments. The tools like PCA, ANN and PLS allow data modeling and prediction, exploration of mechanisms supported on molecular descriptors important for separation, etc.

Dr. Carla Brazinha presented few equipment items in FCT laboratories, which could be interesting for the TFNS team and the joint research. She talked about protein fractionation by pressure driven membrane processes, and introduced the hollow fiber module prepared in the FCT laboratory. She also presented results of a very inovative research on gas permeation and separation of gases, showing the equipment of vapor permeation and pervaporation unit. Also she showd the equipment for measurement of interfacial tension values and contact angles.

Dr. Sylwin Pawlowski explained electricity generation by reverse electrodialysis where the gradient is the salinity difference. He also talked about the development of profiled membranes, for instance, permselective membranes which can be used for generation of desalinated and clean water. He introduced us the profiled ion exchange membranes, otherwise called membranes with designed topography, with aim to significantly improve the performance of electrodialysis or reverse electrodialysis. Dr. Pawlowski shared the information about the modeling the velocity fields by CFD. He also presented the work performed with a 3D printer and an electrospinning unit, what they use for making different membranes.



*Presentation of pressure driven membrane processes and reverse electrodialysis at FCT by Carla Brazinha*

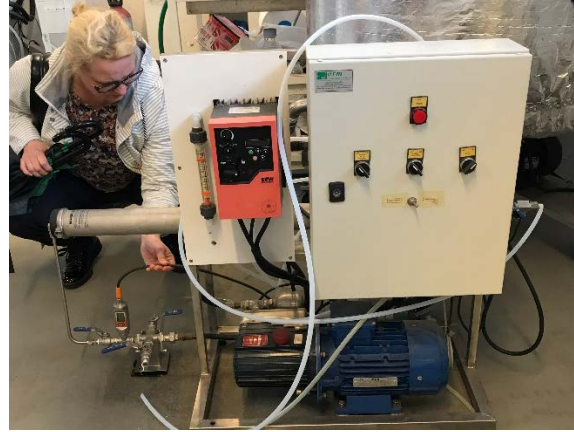
The morning and the afternoon sessions of the second day at UNL were dedicated to the working meeting with Prof. Crespo on planning of the project activities in 2023. A draft of the mobility scheme, joint research and the presentations were agreed. The teams agreed that both longer visits of seniors are necessary for institutional issues, international collaboration, PhD studies, project proposal discussion. At least two short term study exchanges of TFNS researchers are agreed to be organized at UNL in 2023. According to the availability of the UNL researchers few online and/or onsite trainings for TFNS team will be carried in 2023.

On the third day of training, Dr. Vanessa Pereira from iBET presented the principals of the advanced oxidation combined with membrane processes, and the existing equipment at UNL for this kind of research, presenting the results obtained on selected CECs removal by nanofiltration combined with low pressure ultraviolet photolysis; the TFNS team learned about principles on how to conduct similar research. Additionally, the TFNS team was introduced into the semi-industrial nanofiltration unit at iBET. After the lunch, the meeting with Prof. Maria do Rosário Bronze, the head of the Food and Health Division of iBET was arranged, during which the presentation of the Division was given, explaining the range of research topics covered. Dr. Naiara Fernandez Hernandez joined the meeting and presented the latest research on green extraction technologies used at iBET for separation of high value added bioproducts.

During the fourth day of training, representatives of IRIS Office of FCT gave a series of presentations explaining the role of the Office as a knowledge valorization facilitator at FCT. At first Juliana Monteiro, Executive Director of IRIS, gave a full introduction of their office, with their job titles and work distributions. She introduced the whole system and the way of their development from the beginning of IRIS. Additional presentations were given by Bernardo Hourmat, Miguel Martins, Marta Cerejo and Pedro Almeida according to the Training program.

In the morning session of the fifth training day a meeting with representatives of UNL Doctoral School was arranged. The presentations of the activities of the Doctoral School were given by Elsa Caetano and Catarina Pinto, while Prof. Crespo and Prof. António Grilo also presented the background of the Doctoral School establishment and financing, as well as the further developments expected in the upcoming period.

In this way, the TFNS team had an opportunity to learn more about issues important for WP5 and possible approaches in development of the soft skills of researchers.



*Visit to iBET and meeting with Vanessa Pereira, Naiara Fernandez Hernandez and Maria do Rosário Bronze*



*Meeting at IRIS Office - knowledge valorization facilitator at FCT*



*Meeting with representatives of UNL Doctoral School*



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**December 12-16, 2022**

#### AGENDA

December 12, 2022

9,00-12,00 Mafalda Cadima, Operation of MetCell and Osmonics installation

12,00-13,30 Lunch break

13,30-14,30 Cláudia Galinha, Machine learning;

14,30-15,30 Carla Brazinha, Membrane contactors/emulsification;

15,30-16,30 Sylwin Pawlowski, Electromembrane processes and Computational Fluid Dynamics

16,30-17,00 Visit to lab for 3D printing and electrospinning

December 13, 2022

9,00-12,00 Working meeting for planning the project activities in 2023 – training and short term scientific exchange (STSE)

12,00-13,30 Lunch break

13,30-17,00 Working meeting for planning the project activities in 2023 – joint research and presentations

December 14, 2022

9,00-12,00 Vanessa Pereira, Advanced oxidation combined with membrane processes, Visit to iBET labs on advance oxidation processes and semi-industrial nanofiltration unit

12,00-13,30 Lunch break

13,30-15,00 Maria Rosario Bronze, Naiara Fernandez Hernandez, Visit to iBET Food and Health Division labs

December 15, 2022

9,00-12,00 Working session I at Innovation Research and Impact Strategy Office (IRIS) and International office at FCT:

Juliana Monteiro, Executive Director of IRIS, and Marta Cerejo, Head of Intellectual Property & Tech Transfer Department, Introduction to IRIS

Bernardo Hourmat, Pre-award (training) services

12,00-13,30 Lunch break

13,30-17,00 Working session II at IRIS office and International office

Miguel Martins, Nova Research Portal

Marta Cerejo and Pedro Almeida, Knowledge valorization and intellectual assets

December 16, 2023

9,00-12,00 Meeting at UNL Rectorate

Elsa Caetano, Catarina Pinto and António Grilo, Presentation of Doctorate School project

12,00-13,30 Lunch break

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