
Curriculum vitae - CV

Raquel García Pacheco

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Current work position

University of Girona, LEQUIA Research Group

Professional category: **Post-doctoral researcher. TECNIOSpring+ and Marie Curie fellow**

Current project: Integration of recycled membranes in water processes (Mem 2.0)

Brief scientific production

- 1 Patent, 1 IP registration, 1 Thesis, 7 scientific papers (6 of them in Quartile 1), 5 chapters book, 5 peer reviewed conferences papers, 6 dissemination papers and 18 contributions to both national and international congresses.

- Participation writing 11 national and European R&D proposals to get financial funding (6 projects were granted). It has been involved in 8 projects (technical and dissemination projects): European (TecnioSpring Mem2.0, Life-Transfomem, Researcher's Night), international (international cooperation) and National (INREMEM, REMTAVARES, Scientific week and TRAGUA).

Education

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| 2011-2017 | PhD at University of Alcala (UAH) and IMDEA Water, Spain. Thesis on: Nanofiltration and ultrafiltration membranes from end-of-life reverse osmosis membranes. A study of recycling. Defended on 11 May 2017. Average score: Cum laude. International mention and option to obtain extraordinary prize of excellence (submission by 2018). |
| 2010 -2011 | MSc in hydrology and water resource management of UAH and University of Rey Juan Carlos (URJC), Spain. Average score of the master 8/10 and the Master Thesis 10/10. |
| 2003-2008 | Chemical Engineering at the URJC, Spain. Average score 6.98/10 and Final Project 9/10. |

Complementary education (attended courses)

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|------|---|
| 2018 | - Size-exclusion chromatography - organic carbon detection - organic nitrogen detection (LC-OCD-OND) technique. UNSW (4h) |
| 2015 | - Horizont 2020: Business Plans for writing proposals (7 h). Fundación para el conocimiento madri+d.
- Patents search seminar (4 h). IMDEA Water and Spanish Patent and Trademark Office.
- First aid (8 h). Unipresalud and Imdea Water. |
| 2013 | - Emergency Response Unit (ERU) curse: ERU Massive sanitation (SANMAS), (1-9 June) Spanish Red Cross, Guadarrama, Madrid. |
| 2011 | - Emergency Response Unit (ERU) curse: ERU Water and Sanitation (WATSAN), (15-22 May) Spanish Red Cross, Guadarrama, Madrid. |

Mobility experience

Academic and science related

- **2018.** Visiting Fellow at University of New South Wales (UNSW) to develop **1 year** of TecnioSpring Mem2.0 project. Collaboration with Pierre Le-Clech research group and [UNESCO Centre for Membrane Science & Technology](#).
- **2012.** Instalation of the first water analysis laboratory in the National System of Protected Areas (SNAP) managed by ECOVIDA, Cuba (9 month project (one week deployed), UAH grant).

- **2011.** Predoctoral research stay, August – December (**4 months**). University of Edinburgh (United Kingdom) within Membrane Technology group led by Dr. Andrea Schäfer. Investigation on low-cost cleaners for end-of-life RO membranes at laboratory scale. Master Fellowship.
- **2008.** University internships at Repsol Technology Center, Elastomers department, March-September (**6 months**), Móstoles (Spain). Main Research Project: how to improve industrial proprieties of rubber. Fellowship as technical staff.
- **2006.** ERASMUS, September 2006 – August 2007 (**1 year**) Polytechnic of Turin (Italy) during 4th year of Chemical Engineering studies. Mobility grant.

International cooperation: emergency response for drinking water, sanitation and hygiene promotion assistance (ERU). One month deployment.

- Bangladesh population movement (December 2017, ERU SANMAS).
- Hurricane Mathew, Haiti (November 2016, ERU WATSAN).
- European Refugee Crisis, Greece (May 2016, ERU SANMAS).
- Typhoon Hayan, Philippines (November-December 2013, ERU WATSAN).

Personal skills

Language

Mother tongue: Spanish.

Other Language:

- English (fluent). Writing scientific papers, project proposal and Thesis. Conducting oral presentation at international congresses.
- Italian (fluent). Erasmus at Politecnico di Torino.

Coordination and management

- **Technical responsible and coordinator of the European Project Life-Transfomem** (2014-2018).
- **Voluntary Focal Point at National level of ERU WATSAN** (October 2015-currently).

Dissemination and community manager

Knowledge in dissemination and community manager (I am currently managing Twitter, facebook, google+, linkedin and the website of the European project Life-Transfomem). This includes writing news and dissemination articles for technical and general public, creating videos, leaflets, periodic newsletters and giving oral interviews. These entire documents are available at Life-Transfomem web.

I have participated in several **dissemination activities** (between 4-8 h each), which involve designing the content, coordination and implementation of the activity to general public. Some examples were within European Projects (Night Researchers, Big Picnic, Life-Transfomem), National projects (Scientific Week) and Red Cross Volunteer events.

Teaching skills

- **Master of Hydrology and Water Resources Management of University of Alcala and University of Rey Juan Carlos (URJC)** (From 2012- currently). Lessons and master thesis tutor of 7 students.
- **Master in *International Solidarity Action on Social Inclusion* of University of Carlos III.** Workshop in: Basic intervention sectors after a natural disaster: WASH actions Madrid. 6th April 2016 (2 h).
- **Postgraduate study in Water, Sanitation and Hygiene at International Cooperation level. University of Alcala and Action Against Hunger (ONG).** Workshop in Emergency Response Unit: WASH Actions. 1st December 2015 (4 h).
- Sanitation Course at Canal de Isabel II (volunteer Canal). Course on WW management at international cooperation and emergency response. Madrid from 23th al 28th April 2012 (20 h).
- **Workshop “The New Water Culture”,** University of Alcalá. Guadalajara 2010 (4h) and 2012 (4h).

Reference

- Pierre Le-Clech (Associate Professor UNSW, Chemical Engineering) p.le-clech@unsw.edu.au
- Joaquim Comas (Tenured university professor of University of Girona - LEQUIA) quim@lequia.udg.cat
- Eloy García Calvo (Head of IMDEA Water): eloy.garcia@imdea.org
- Elena Campos Pozuelo (R&D Responsible, Valoriza Agua) ecamposp@sacyr.com

2. ACADEMIC QUALIFICATIONS PORTFOLIO

2.1 Research qualification portfolio

- i. List of all publication
- ii. List of research qualifications
- iii. Research grants

2.2 Teaching qualification portfolio

2.3 Qualification portfolio for leadership and administrative assignments

2.4 Qualifications portfolio for innovation, entrepreneur-ship and external engagement

2.1. Research qualifications portfolio

i) List of publications

Peer-reviewed published articles

1. Molina, S., Landaburu-Aguirre, J., Rodríguez-Sáez, L., **García-Pacheco, R.**, De la Campa, J., García-Calvo, E. 2018. Effect of sodium hypochlorite exposure on polysulfone recycled UF membranes and their surface characterization. *Polymer Degradation and Stability*, 150 46-56. (Journal Impact Factor: 3.3386) <https://doi.org/10.1016/j.polymdegradstab.2018.02.012>
2. **García-Pacheco, R.**, Landaburu-Aguirre, J., Terrero, P., Campos, E., Molina, F., Rabadán, J., Zarzo, D., García-Calvo, E. 2018. Validation of recycled membranes for treating brackish water at pilot scale. *Desalination* 433 199-208 (Journal Impact Factor: 5.527). <https://doi.org/10.1016/j.desal.2017.12.034>
3. Landaburu-Aguirre, J., **García-Pacheco, R.**, Molina, S., Rodríguez-Sáez, L., Rabadán, J., García-Calvo, E. (2016). Fouling prevention, preparing for re-use and membrane recycling. Towards circular economy in RO desalination, *Desalination* 393 16–30, ISSN 0011-9164, <http://dx.doi.org/10.1016/j.desal.2016.04.002>, 7 citations (Journal Impact Factor: 5.527).
4. **García-Pacheco, R.**, Landaburu-Aguirre, J., Molina, S., Rodríguez-Sáez, L., Teli, S. B., & García-Calvo, E. (2015). Transformation of end-of-life RO membranes into NF and UF membranes: Evaluation of membrane performance, *Journal of Membrane Science* 495 305–315, ISSN 0376-7388, <http://dx.doi.org/10.1016/j.memsci.2015.08.025>, 12 citations (Journal Impact Factor: 6.035).
5. Vivar, M., Fuentes, M., Castro, J., **García-Pacheco, R.** (2015). Effect of common rooftop materials as support base for solar disinfection (SODIS) in rural areas under temperate climates, *Solar Energy* 115, 204-216, ISSN 0038-092X, <http://dx.doi.org/10.1016/j.solener.2015.02.040>, 9 citations (Journal Impact Factor: 4.018).
6. Vivar, M., Fuentes, M., **García-Pacheco, R.**, De Bustamante, I. (2013). Clean water photovoltaic sensor for solar disinfection in developing countries, *Solar Energy Materials and Solar Cells* 117, 549-563, ISSN 0927-0248, <http://dx.doi.org/10.1016/j.solmat.2013.07.021>, 6 citations (Journal Impact Factor: 4.784).
7. De Miguel, Á. and Lado, J.J. and Martínez-Hernández, V. and Leal, M. and García-Pacheco, R. (2009) Hydrology cycle: experimental cases for its understanding. In Spanish: El ciclo hidrológico: experiencias prácticas para su comprensión. *Enseñanzas de la Ciencias de la Tierra*, 17 (1). pp. 78-85. ISSN 1132-9157, 4 citations.

Peer Reviewed Conferences Papers

1. Terrero Rodríguez, P., **García-Pacheco, R.**, Campos, E., Molina, F., Pomata, D., Senán, J., López-Sepúlveda, M., Calzada, M., Martínez, D., Landaburu-Aguirre, J., Zarzo, D., García-Calvo, E. XII Congreso Internacional de Aedyr, *AedyrTOL18-39*, 23rd – 25th October 2018, Toledo.
2. **García-Pacheco, R.**, López-Sepúlveda, M., Terrero Rodríguez, P., Campos Pozuelo, E., Molina Serrano, F., Karela, A., Zarzo, D., García-Calvo, E. LIFE13 TRANSFOMEM: Reclaiming wastewater using recycled ultrafiltration membranes. IDA International Water Reuse and Recycling Conference, IDA18WRR-60313, 24th - 27th June 2018, Valencia.
3. Terrero, P., **García-Pacheco, R.**, Campos E., Rabadán, Fco. J., Molina, S., Ortíz de Lejarazu, A., Calzada, M., Zarzo, D. Transformation of end-of-life RO membrane into recycled NF and UF membranes: results or transformation process (IDAWC17-58237). Previously published as part of The International Desalination Association (IDA) World Congress Proceedings 15-20 October 2017 Sao Paulo, Brazil.

4. García-Pacheco, R., Rabadán, F. J., Terrero, P., Molina Martínez, S., Martínez, D., Campos, E., Molina, F., Rodríguez Sáez, Ortiz de Lejarazu, Landaburu-Aguirre, Zarzo D., García-Calvo, E. Life+13 Transfomem: a recycling example within the desalination world. In XI AEDYR International Congress (pp. VAL-112-16). Valencia 19-21 October 2016.

5. Molina, S., **García-Pacheco, R.,** Rodríguez-Sáez, L., García-Calvo, E., Campos, E., Zarzo, D., et al. Transformation of end-of-life RO membranes into recycled NF and UF membranes: surface characterization (15WC-51551). Previously published as part of The International Desalination Association (IDA) World Congress Proceedings, San Diego, California, USA 2015.

Conferences presentation

1. Oral presentation. Terrero Rodríguez, P., **García-Pacheco, R.,** Campos, E., Molina, F., Pomata, D., Senán, J., López-Sepúlveda, M., Calzada, M., Martínez, D., Landaburu-Aguirre, J., Zarzo, D., García-Calvo, E. LIFE+13 TRANSFOMEM: validación de membranas recicladas en procesos de filtración a media y baja presión. XII Congreso Internacional de Aedyr, AedyrTOL18-39, 23rd – 25th October 2018, Toledo.

2. Poster. **García-Pacheco, R.,** Ortiz de Lejarazu, A., Landaburu-Aguirre, J., Molina, S., Ransome, T., García-Calvo, E. Usage of ppm h concept for membrane aging. Polyamide tolerance to free chlorine, Euro-Membrane 2018, [657], 9th -13th July 2018, Valencia.

3. Poster. Senán-Salinas, J., **García-Pacheco, R.,** Landaburu-Aguirre, J., Molina, S., Terrero, P., García-Calvo, E. Environmental and economic assessment of reverse osmosis recycling to nanofiltration and ultrafiltration at pilot scale, Euro-membrane 2018, [609], 9th -13th July 2018, Valencia.

4. Oral presentation **García-Pacheco, R.,** López-Sepúlveda, M., Terrero Rodríguez, P., Campos Pozuelo, E., Molina Serrano, F., Karela, A., Zarzo, D., García-Calvo, E. LIFE13 TRANSFOMEM: Reclaiming wastewater using recycled ultrafiltration membranes. IDA International Water Reuse and Recycling Conference, IDA18WRR-60313, 24th - 27th June 2018, Valencia.

5. Oral presentation. Senán-Salinas, J., **García-Pacheco, R.,** Molina, S., Landaburu-Aguirre, J., Terrero, P., García-Calvo, E. Closing the loop of reverse osmosis: LCA application during the scaling-up, IV Workshop esLCA, October 27th 2017, Santander.

6. Oral presentation. Senán-Salinas, J., **García-Pacheco, R.,** Molina, S., Terrero, P., García-Calvo, E. Life Cycle Assessment of transformation end-of-life RO membrane modules alternatives into UF and NF membrane modules in pilot scale, 10th World Congress of Chemical Engineering, 1st-5th October 2017, Barcelona.

7. Poster. Senán-Salinas, J., Mario Gómez, C., **García-Pacheco, R.,** Sánchez-Lozano, N., Terrero, P., García-Calvo, E. End-of-life Reverse Osmosis membrane valorisation as Ultra-filtration and Nano-filtration under an economical and financial sight, 10th World Congress of Chemical Engineering, 1st-5th October 2017, Barcelona

8. Oral presentation. Senán-Salinas, J., **García-Pacheco, R.,** Molina, S., Landaburu-Aguirre, J., García-Calvo, E. Life Cycle Assessment (LCA) application at pilot scale during the eco-design process of Reverse Osmosis membrane recycling into Ultrafiltration and Nanofiltration, 2nd esLCA Workshop: "Food, Agriculture and Water: Life Cycle Assessment as a tool towards sustainability", 17th May 2017, Barcelona.

9. Oral presentation. **García-Pacheco, R.** et al. Validation of NF and UF recycled membranes at pilot scale, 3rd International Conference on Desalination Using Membrane Technology (OA35) 2nd-5th April 2017, Gran Canarias.

10. Oral presentation. **García-Pacheco, R.** et al. Proyecto LIFE TRANSFOMEM: Iniciativa de reciclaje en desalación. XI Congreso Internacional de AEDYR 19th-21st October 2016, Valencia.

11. Oral presentation. Molina, S., **García-Pacheco, R.** et al. Transformation of end-of-life RO membrane into recycled NF and UF membranes: Surface characterization. IDAWC'15, 30th August – 04th September 2015, San Diego.

12. Oral presentation. **García-Pacheco R.** 2015. Evaluation of the ppm·h concept to transform end-of-life membranes into recycled NF and UF membranes. International Journal of Waste Resources, proceeding of World Congress and Expo on Recycling, July 2015 Barcelona.

13. Oral presentation. **García-Pacheco, R.** Recovery of Waste RO Membranes to Reuse them in Wastewater Treatment, Workshop new developments on water and wastewater treatment Technologies, 27th November 2012, Alcalá de Henares.

14. Poster. Teli, SB., **García-Pacheco, R.** and Arregoitia Sarabia, C. Poly(vinyl alcohol)-H-ZSM-5 zeolite mixed matrix membranes for pervaporation separation of methanol-benzene mixture. ICOM 23-29th July 2011, Amsterdam, Holand.

15. Oral presentation. Leal, M., **García-Pacheco, R.** de Miguel, Á, Martínez-Hernández, V. TOC, nitrogen and phosphorus adsorption by different reactive materials: application to the wastewater reuse through horizontal permeable reactive barriers, 2nd IWA Spain National Young Water Professionals Conference, 15-17th July 2011, Madrid.

16. Oral presentation. De Miguel, A., Martínez-Hernández, V., Leal, M. and **García-Pacheco, R.** Wastewater reuse for irrigation and bio-diesel production in small communities. 2nd IWA Spain National Young Water Professionals Conference, 15-17th June 2011, Madrid.

17. Oral presentation. De Miguel, A., Moyano, M., de Bustamante, I., Lillo, J., Leal, M., **García-Pacheco, R.**, Salas, J.J. and Martín, I. Feasibility of wastewater irrigation for small-scale biodiesel production, 3rd International Congress Smallwat 2011, 25-28th abril 2011, Sevilla.

18. Oral presentation. Leal, M., **García-Pacheco, R.**, Lillo, J., de Miguel, A., Martínez-Hernández, V., de Bustamante, I. And Carreño, F., Reuse and regeneration of treated waste water by permeable reactive barriers: Characterizing reactive behaviour of material, VII ANQUE International Congress, 13-16th June 2010, Oviedo.

Book Chapters

1. **García-Pacheco, R.**, Lawler, W., Landaburu-Aguirre, J., García-Calvo, E., and Le-Clech, P. End-of-Life Membranes: Challenges and Opportunities, In Reference Module in Chemistry, Molecular Sciences and Chemical Engineering, Elsevier, 2017. Also published in E. Drioli (Ed.), Comprehensive Membrane Science and Engineering II (2nd ed.). Elsevier Oxford, 2017, 293-310, ISBN 9780444637963, <https://doi.org/10.1016/B978-0-12-409547-2.12254-1>.

2. Virtudes Martínez-Hernández De Miguel, Á. and **García-Pacheco, R.** 2012. Didáctica del agua subterránea dentro del ciclo hidrológico a través de actividades prácticas. Publicaciones del Seminario de Paleontología de Zaragoza, Seminario de Paleontología de Zaragoza, 57-60. ISBN 978-84-92522-25-5.

3. Irene De Bustamante et al. 2012. Chapter 4: Reutilización para riego y recarga. In: Experiencias prácticas de reutilización en el marco del programa Consolider Tragua, Consolider Tragua p 24-44. ISBN 978-84-695-4013-8; 978-84-695-4014-5

4. **García-Pacheco, R.** and Rodríguez, A.. 2012. Chapter 8.1. Estado del arte de la regeneración de aguas residuales mediante membranas. In: Tratamientos avanzados de aguas residuales industriales. Colección Ciencias Experimentales y Tecnología. Servicio de Publicaciones de la Universidad Rey Juan Carlos, p 164-171. ISBN: 978-84-9031-147-9

5. **García-Pacheco, R.** and García-Calvo E. 2011. Estado del arte del ensuciamiento, limpieza y modificación de la superficie de membranas de filtración para el tratamiento de disoluciones acuosas, Proyectos 2011 – Master in hydrology and water resource management. ISBN 978-84-695-1236-4.

Technical reports

Technical report developed within the European project Life-Transfomem.

The following deliverables have been partially or totally written by the applicant. All of them have been reviewed by the European Commission.

- Monthly report for monitoring the IMDEA Water activities within the project framework (2014-currently).
- Annual project progress report, July 2017 (Covering the project activities from 01/05/2016 to 30/04/2017). Including the following final technical deliverables.
 - Report of recycled nanofiltration and ultrafiltration membranes characterization: membrane surface and membrane performance (comparison with end-of-life RO membrane characterization). D.B.3.1.
 - Event report Summary of organized visit, trainings, workshops and attended conferences.
- Midterm Report, May 2016 (Covering the project activities from 01/06/2014 to 30/04/2016). Including the following final technical deliverables.
 - Report of end-of-life RO membrane characterization: membrane surface and membrane performance. D.B.2.1 (31/05/2015).
- January 2015 (Covering the project activities from 01/06/2014 to 28/02/2015).

Submitted project call proposals: Participation at writing process

Title of Proposal: Hybrid membrane processes for water and nutrient recycling: from wastewater treatment to resource recovery (ReNuAqua). European project (H2020 Innovation Action/ Circ-02-2016-2017). Coordinator Entity: IMDEA Water. Participation percentage of the applicant: 5%. Second stage, Not funded (submitted 2017). English language.

Title of proposal: Potato processing agricultural wastes as feedstock for new products and their applicability in agroindustrial processes (Powinpro). European project (H2020, WASTE-7-2015 Type of action: RIA). Participation percentage of the applicant: 10%. Second stage, Not funded (submitted 2015). English language.

Title of proposal: Innovation and recycling of membrane for water treatment (INREMEM). National project (Retos Investigación). **Participation percentage of the applicant: 30%. Funded** (submitted 2015). Spanish language.

Title of proposal: Transformation of disposed reverse osmosis membranes into recycled ultrafiltration and nanofiltration membranes (Transfomem). **European project (LIFE, Environment Policy and Governance). Participation percentage of the applicant: 95%. Funded** (submitted 2013). Spanish language.

Title of proposal: Installation of the first water analysis laboratory in the National System of Protected Areas (SNAP) managed by ECOVIDA. International cooperation project (funded by Alcalá University). **Participation percentage of the applicant: 50%. Funded.** (submitted 2011). The technical justification of the project was written mostly by the applicant in 2012 after the project was conducted. Spanish language.

Title of proposal: New ERU Water Treatment Plant with integrated energy and water local resources management. Humanitarian Innovation Fund Large Grant Full Application. Participation percentage of the applicant: 20%. Second stage, Not funded (submitted 2013). English language.

Title of proposal: Research and development of membrane recycling and reuse processes. National project (Retos colaboración). **Participation percentage of the applicant: 80%. Conceded** but not funded due to economical problems of one of the partners (submitted 2011). Spanish language.

Other Technical reports. IMDEA Water external service.

Membrane autopsy report (December 2016 and 2011). External service of IMDEA Water to a desalination company.

Microbiological report for *Salmonella* identification in a water sample (2013).

Microbiological report for *E.coli* and total coliform identification in a water samples (2011-2014).

Patents

Spanish Patent PCT/EP2016/30931 (08 July 2016). García-Pacheco, R., Molina, S., Rodríguez-Sáez, L., Rabadán, J., Landaburu-Aguirre, J., Ortíz de Lejarazu, A., García Calvo, E., Campos, E., Terrero, P., Zarzo, D., Molina, P., Calzada, M. Proceso de transformación de membranas de poliamida con enrollamiento en espiral que han agotado su vida útil en membranas de utilidad industrial. In English: **Transformation of spiral wound polyamide membranes after its industrial lifespan**. Applicants: IMDEA Water (50%) and VALORIZA Water (50%).

The invention concerns the recycling of end-of-life RO and NF membranes into NF and UF membranes using two methodologies (passive immersion of membrane into a chlorine solution and active circulation of chlorine solution through the membranes). Main task: participation in designing of the pilot plants and designing of experiments that led to the creation of a free chlorine decision-making tree for recycling membranes according to membrane type (SW or BW water), membrane fouling and end-of-life membrane rejection. Fundamental research conducted during the PhD and supervision of experiments at pilot scale.

IP registration

Spanish IP Registration M-4232-15 11 January 2016 (IMDEA Water). Vivar, M., Fuentes, M, Aguilera, J., García-Pacheco, R., De Miguel, A. Gestión de un sistema híbrido fotovoltaico-eólico-diésel de generación de energía para plantas potabilizadoras móviles en situación de emergencia con carga continua, 24 h. de operación y uso nocturno sin generador diesel. In English: **Management of a Photovoltaic-Eolic-Diesel hybrid energy production system for drinking water emergency response mobile plants, with 24 continuous operation and nocturnal use without diesel generator**.

Main task of the applicant: literature review for writing the IP document, preliminary design of the mobile plant and operation with an additional membrane module.

Popular science articles/presentations

1. **García-Pacheco, R.** et al. 2015. LIFE+13 TRANSFOMEM. En: FuturEnviro, September, 35-41.
2. **García-Pacheco R.** y Molina, S. 2015. Una alternativa a la gestión de membranas desechadas. In: desalación, alternativa ineludible. i-agua magazine, 8, 91.
3. **García-Pacheco, R.** LIFE13 TRANSFOMEM: Transformación de membranas desechadas de ósmosis inversa en membranas de ultrafiltración y nanofiltración. Interempresas.
4. **García-Pacheco, R.** et al., 2015. Recycling Membranes. International Innovation Dissemination science, research and technology, A renewable future, 60-62.
5. Landaburu, J., **García-Pacheco, R.**, Molina, S. 2015. Membranas de ósmosis inversa: del residuo al recurso. Weblog REMTAVARES, febrero 2015.
6. **García-Pacheco, R.** 2010. Cuando hay recurso pero no hay medios. Dos hechos esenciales: captura de agua y desinfección. Weblog REMTAVARES, octubre 2010.

Further publications

1. García-Pacheco, R. et al 2018. Usage of ppm h concept for reverse osmosis membrane aging and membrane recycling. Ready to be submitted (Thesis scientific production, paper).
2. García-Pacheco, R. et al 2018. Reuse of Ultrafiltration recycled membranes in seawater and wastewater treatment. To be written during 2018 (Life-Transfomem project scientific production, paper).

ii) List of research qualifications

National and international research collaborations and projects (not granted. See Section 4 for research grant projects)

Title: SW30 HRX-400i (Dow Filmtec™): Study of membrane resistance to free chlorine exposure (Collaboration with Perth Desalination Plant, Australia). Contact: Tom Ransome (Operation Manager). The main scope of the study was to determine if the PA membrane degradation in the desalination plant is due to mechanical problems of the membrane or due to chlorine degradation. It was conducted at IMDEA Water institute. The collaboration started after the applicant and Tom met in the International Desalination Congress in San Diego (2015).

International exchanges

Fellowships and mobility grants

1. PhD research stay, August – December 2011. University of Edinburgh (United Kingdom) within Membrane Technology group led by Dr. Andrea Schäfer. Investigation on low-cost cleaners for end-of-life RO membranes at laboratory scale. Fellowship of master.
2. University internships at Repsol Technology Centre, Elastomers department, March-September 2008, Móstoles (Spain). Main Research Project: how to improve industrial proprieties of rubber. Fellowship as technical staff.
3. ERASMUS, September 2006 – August 2007 Polytechnic of Turin (Italy) during 4th year of Chemical Engineering studies. Mobility grant.

Mobility experiences

1. International cooperation: science related

Installation of the first water analysis laboratory in the National System of Protected Areas (SNAP) managed by ECOVIDA, Cuba (2012, 9 month project (one week deployed), UAH grant.

2. International cooperation: emergency response for hygiene promotion, drinking water and sanitation assistance (ERU). One month deployed.

- Bangladesh Population Movement (December 2017, ERU SANMAS)
- Hurricane Mathew, Haiti (November 2016, ERU WATSAN).
- European Refugee Crisis, Greece (May 2016, ERU SANMAS).
- Typhoon Hayan, Philippines (November-December 2013, ERU WATSAN).

Participation in and cooperation within relevant networks linked to companies or other sectorial/society-related networks

During her university studies, Dr. García-Pacheco worked for Demoscopia (private company, 2003 during 2 months) conducting face to face people interviews for measuring the opinion of people about some new commercial products. In addition, she spent 6 month (part time) at the Repsol Technology Center (2008). Moreover, during her PhD she was working closely with companies during several years. Some examples are the Sacyr Group (Valoriza Agua and Sadyt staff) through the R&D departments, with whom she has been cooperating since 2011 writing proposal and developing the Life-Transfomem

project (see Annex Attachment, Elena Campos's recommendation letter); or Zabala, a consultant company, which help to IMDEA Water to justify the LIFE Transfomem project (from 2013 to the date). Moreover, due to the participation in international congress (IDAWC 15) she has established networks with Prof Pierre Le Lech from (University of New South Wales (UNSW)). They have written a book chapter (see Section C, publication 4) and have participated writing a post-doctoral proposal within TecnioSpring Plus research program (Outgoing + return call, co-financed by the H2020 Marie Skłodowska-Curie actions). This proposal has involved also to Prof. Joaquim Comas from University of Gerona (LEQUIA-UdG). Finally, thanks to IDAWC 15, a non-granted project is being developed in cooperation with Perth Desalination Plant (Australia).

Research symposia and conferences

Organisation

Workshop on "End-of-life membrane management and reuse of recycled membrane" under Life-Transfomem Project framework. It was conducted at IMDEA Water Institute (Madrid) and it included a visit to the Guadalajara Wastewater Treatment Plant (Spain). 40 people maximum forum. 16 May 2018.

Invitation to give key note lectures

1. García-Pacheco R. Second hand membrane systems in Water Industry: reality or fiction?, University of New South Wales, Sydney 18th June 2018.
2. García-Pacheco, R. Reciclaje de membranas de ósmosis inversa y su reutilización para el tratamiento de agua de mar, agua salobre y aguas residuales. Webminar "Oportunidades de innovación en el sector del agua y programas de apoyo", Observatorio industrial de Canarias - Instituto Tecnológico de Canarias, 21 Mayo 2018. <https://youtu.be/DPp8uYN-iT8>
3. García-Pacheco R. End-of-life RO Membrane recycling and reuse. De Nora Workshop, Milan 28th September 2017. Poster session.
4. Life-Transfomem: reuse of recycled membranes (NF-UF) in water treatment. Membranes for water treatment and reuse workshop, Girona 15 June 2017. Lecture.
5. Recycling end-of-life RO membranes into NF and UF membranes, Process Network (NL GUTS), Uden (Holland), 7th February 2017. Lecture.

Assessment of other's work

Peer Reviewer (2016- currently)

4 papers at Journal Membrane of Science, Desalination and Desalination and Water Treatment.

Final Master Thesis Committee Master in Hydrology and Waster Resources Management (UAH-URJC) 02-February-2018

Evaluation of 10 final master Thesis oral presentations of Master on Hydrology and Water Management (UAH-URJC, online master).

Monitoring Quality Committee of Master in Hydrology and Waster Resources Management (UAH-URJC) 2011-2014

Development and evaluation of surveys focus on student opinion related to the master and how to improve the quality of theory and practical contents. Report of results to the Master's Director.

iii) Research grants

Research Projects

1. **Integration of recycled membranes in water processes (Mem2.0).** LEQUIA (University of Girona) – University of New South Wales. (2018-2020). PI Joaquim Comas. TecnioSpring+ Ref. TECSPR17-1-0019. **European Project (114053.85 €).** Funding from the European Union's Horizon 2020 research and innovation programme under the **Marie Skłodowska-Curie grant** agreement No 712949 (**TECNIOspring PLUS**) and from the Agency for Business Competitiveness of the Government of Catalonia. **Applied research.**
2. **Innovation and recycling of membrane for water treatment.** Innovación y reciclaje de membranas para el tratamiento de agua (INREMEM). In (IMDEA AGUA). (2016-2018). PI: Eloy García Calvo. Ref: TM2015-65348-C2-1-R. **National Project (312.470€).** Funded by Science and Innovation Ministry (MINECO). Main tasks of the applicant: Preparation of ultrafiltration recycled membranes from end-of-life RO membranes, conducting autopsies and participating at the life cycle assessment study (see Section D3, conference presentation 1, 2 and 4). **Fundamental research.**
3. Transformation of end-of-life reverse osmosis membranes into nanofiltration and ultrafiltration membranes. **Transformación de membranas desechadas de ósmosis inversa en membranas recicladas de ultrafiltración y nanofiltración.** (IMDEA AGUA). 2014-2018. PI: Eloy García Calvo. Ref: LIFE13 ENV/ES/000751 TRANSFOMEM. **European project (954.977 €).** Cofounded by European Community LIFE project, IMDEA Water, Sadyt and Valoriza Agua. Main tasks of the applicant: fundamental research during the PhD Thesis and parallel, scale up of the membrane recycling protocols at pilot scale for two methodologies and systems. Data management of the results related to membrane recycling and reuse at i) full scale brackish water desalination facility, ii) at pilot scale for seawater pretreatment and wastewater treatment. Participating also at economical and financial study. See the Life-Transfomem scientific production at Section D3 (peer reviewed paper 1-2, peer reviewed conferences papers 1-3, conference presentation nº 3; book chapter nº 1, oral presentation 5-8); technical reports and patent). **Applied research.**
4. **Madrid Network of Advance Treatment for Wastewater with non biodegradable contaminants.** Red Madrileña de Tratamientos Avanzados para Aguas Residuales con Contaminantes no Biodegradables. IMDEA AGUA. 2010-2014. IP: José Aguado Alonso. Regional project **(1.032.750 €).** Funded by Madrid Regional Government. Main tasks were the design and the development of experiments for treating industrial WW (from a pharmacy industry) using nanofiltration recycled membranes and end-of-life RO membranes. Also, writing a book chapter related to the usage of membrane for industrial WW treatment (see Section D3 book chapter nº 4 and oral presentation nº 9). **Fundamental research.**
5. Wastewater treatment and reuse of reclaimed water for a sustainable management. **Tratamiento y Reutilización de Aguas Residuales para una Gestión Sostenible (TRAGUA)** (URJC, IMDEA AGUA). 2006-2012. PI: Eloy García Calvo. Ref: CSD2006-00044. National project **(5.000.000 €).** **Funded by Economy and Competitiveness.** Main tasks of the applicant were related to soil characterization and batch adsorption experiments using clay, zeolite, active carbon and peat moss for treating synthetic UWW (see Section D3, oral presentations from 11 to 14 and book chapter nº 3). **Fundamental research.**

International cooperation Projects

Installation of the first water analysis laboratory in the National System of Protected Areas (SNAP) managed by ECOVIDA. In Spanish: Instalación del primer laboratorio adjunto al Sistema Nacional de Áreas Protegidas (SNAP) gestionado por el Centro de Investigaciones y Servicios Ambientales (ECOVIDA). PI: Irene de Bustamante. International project funded by University of Alcalá **(36,000 €).** Main tasks of the applicant: coordination Cuban and Spanish team, selection of adequate and sustainable technologies for water analysis, start up of several systems and 3 days training of

water sampling, microbiological, physical and chemical analysis. Additionally, writing the technical justification report of the project. **Applied research.**

Dissemination Projects

1. Big Picnic Project. Fresh water in emergency response to ensure food security. Workshop 21st October 2017, Botanic Garden of Alcala University.
2. Researcher's Night 2016-2018. "Desalination World: tailor made and recycled membranes". Events are supported by the European Commission as part of the Marie Skłodowska-Curie Actions.
3. Researcher's Night 2013-2015. "Science in Emergency response". Events are supported by the European Commission as part of the Marie Skłodowska-Curie Actions.
4. XV-XVI Madrid Science Week 2015-2016. Activity: Membrane Technology: production and recycling. A ECO alternative to effort water scarcity. IMDEA AGUA.
5. IX-X Madrid Science Week 2009-2010. Activity: Made up your own aquifer. IMDEA AGUA.

2.2 Teaching qualifications portfolio

List of teaching qualifications

Formal Teaching at third cycles

1. Master of Hydrology and Water Resources Management of University of Alcalá and University of Rey Juan Carlos (URJC) (From 2012- currently). Lectures, organizing visits to desalination plants and master thesis tutor (see below).
2. Master in International Solidarity Action on Social Inclusion of University of Carlos III. Workshop in: Basic intervention sectors after a natural disaster: WASH actions Madrid. 6th April 2016 (2 h).
3. Postgraduate study in Water, Sanitation and Hygiene at International Cooperation level. University of Alcalá and Action against Hunger (NGO). Workshop in Emergency Response Unit: WASH Actions. 1st December 2015 (4 h).
4. Sanitation Course at Canal de Isabel II (volunteer Canal). Course on WW management at international cooperation and emergency response. Madrid from 23th al 28th April 2012 (20 h).
5. Workshop “The New Water Culture”, University of Alcalá. Guadalajara 2010 and 2012.

Experience of training students

1. As a PhD researcher at IMDEA Water (Alcalá de Henares, Spain, 2011-2017)

a) Training on membrane autopsy of 3 IMDEA Water technical staff, 2014-2017. The training consisted in security knowledge and how to open a spiral wound RO and recycled membranes, unroll membranes, realize the visual inspection, take fouling sample, realize some analysis related to fouling characterization and present the results in a report.

b) Training on how to use a filtering system of a pressure driven membrane of 2 IMDEA Water technical staff and 3 university students, 2014-2017.

c) Training on chemical, physical and microbiological analysis of water. 3 days course, 2012. Within the International and cooperation project of a laboratory installation conducted in Cuba (see section D4, international cooperation project).

2. As a volunteer Focal Point of the Emergency Response Unit in Water and Sanitation (ERU WATSAN) of Spanish Red Cross, since October 2015.

a) Annual Meeting of Emergency response Units (4 days meeting). Organization of 6 hours of activities related to Water, Sanitation and Hygiene promotion (WASH) for around 30 volunteers, September 2016 and 2017.

b) Organization and training implementation of how to use a new Mobile water treatment System for drinking water production in emergency response (2 days course). 20 effective hours, 50 people were trained during two weekends, February and May 2017.

c) Participation at coordinating and training of ERU massive sanitation course (5 days course). Training on hygiene promotion (theory (1.5 h) and practical (4 h)) and household water treatment and safe storage (1.5 h). 30 people were trained, 22-26 May 2017.

d) Training of volunteers within the emergency response in physical, chemical and microbiological analysis and how to use the water treatment mobile plant. Philippines (2013) and Haiti (2016), around 20 volunteers.

Supervision in the first, second and third cycles

Experience of supervision of master thesis students of Master in Hydrology and Waster Resources Management (UAH-URJC). 6 months supervision for each project.

1. Vela-Rodríguez, R. 2017. Drinking water system based on ultrafiltration recycled membrane (ongoing).
2. Senán, J. 2015. Life cycle assessment of a real wastewater treatment plant using OpenLCA.
3. Arquero, Á. 2015. Tertiary treatment: the potential use of reclaimed wastewater.
4. Izquierdo, P. 2014. Reuse of recycled membrane in wastewater treatment.
5. Castro, J. 2013. Effect of material that support SODIS bottles in water disinfection: temperature and radiation increment.
6. García, M. 2013. Solar water disinfection (SODIS) in adverse climatic condition highlighting the possible microorganism regrowth.
7. Torres, M. 2012. Regeneration of end-of-life reverse osmosis membranes to be reused in filtering process.

Experience of supervision of university graduated within ERAMUS PROGRAM

1. Anastasia Karela (1st March to 31st May 2018). Technical staff to support Life-Transfomem project.

Educational development work

1. As PhD researcher at IMDEA Water (Alcalá de Henares, Spain, 2011-2017)

a) Organization of Researcher's Night. Events were supported by the European Commission as part of the Marie Skłodowska-Curie Actions.

- Dissemination activity. "Desalination World: tailor made and recycled membranes". Events are supported by the European Commission, 2016-2018.
- Dissemination activity. "Science in Emergency response", 2013-2015.

b) Organization of XV-XVI Madrid Science Week. Dissemination activity: "Membrane Technology: membrane production and recycling. An eco-alternative to effort water scarcity", 2015-2016.

2. As technical support staff at University Rey Juan Carlos (Móstoles, Spain, 2009-2011)

Organization of IX-X Madrid Science Week 2009-2010 dissemination activity. Activity: Made up your own aquifer conducted in IMDEA Water.

Production of textbooks and production of teaching resources

1. Educational videos for ERU Red Cross volunteers related to:

- Management of the mobile drinking water treatment plant (9 min)
- How to detect E.coli and other coliforms bacteria using a chromogenic coliform agar and portable kit incubator (15 min).

2. Educational poster related to:

- How to detect E.coli and other coliforms bacteria using a chromogenic coliform agar and portable kit incubator.
- Fact sheet with hygiene promotion activities in emergency response.

3. PowerPoint education material to conduct the master lectures and dissemination activities.

4. Analytical Kit-box to develop 2-3 h workshop on how to identify a good water resource in emergency response. It includes, theory case study, educational video, synthetic water samples, analytical water sample kits, household water treatment system (homemade and commercial).

5. Dissemination Kit-box to develop 2-3 h workshop on end-of-life membrane recycling and re-use. It includes, theoretical information, educational posters, real end-of-life reverse osmosis membrane coupons and modules, autopsy description and membrane fouling identification, recycling description methodology.

2.3 Qualifications portfolio for leadership and administrative assignments

List of qualifications concerning leadership and administrative assignments

Experience of leadership within academia

Development of a department group

Since 2010 Dr. García-Pacheco has been working in IMDEA Water. In 2011 she started her PhD regarding recycling and reuse membranes, a completely new research line for the Institute. Due to her dedication and the European funding achieved in 2014, the group grew. Nowadays, IMDEA Water Technology group has 1 Professor (Head of the group), 4 doctors, 3 PhD students.

Leading membrane initiative from 2011 to 2015

She has demonstrated that she can manage large amount of work. She was not only focus on her thesis but also she was able to participate in a remarkable quantity of project proposals (regional, national and European calls), developing partial activities in the granted projects, publishing scientific papers, book chapters and industrial transfer documents (one patent and one intellectual protection registration), supervising university and master students (being tutor of projects or supervising student stages), teaching in several masters and giving national and international conferences.

Moreover, since 2014 she is coordinating and acting as the technical responsible of the Life-Transfomem European project. IMDEA Water is leading the project, which has Valoriza Agua and Sadyt companies as partners (both are part of Sacyr Vallermosto group). This project, basically scales up the basic investigation conducted during her thesis and goes towards an industrial approach. Within the framework of the project, she has been coordinating mainly a team of 10 technical staff and 3 Doctors. She reported the results through periodic reports to the principal investigator and to the Life program Consultant. She has been in charge of management, technical experiments, dissemination and technology transfer actions since the beginning of the project. It includes, organization of the meetings between the project consortium, elaboration of progress report (monthly, midterm and annual progress report), participation at the designing of the experimental part of the project, participation at the pilots plants designs used in the project for membrane recycling and membrane reuse, supervising results achieved, writing scientific papers, conference abstracts and a patent with the result achieved to the date.

Finally, she knows well how to organize timing. Apart of all described, I have an active volunteer participation at Spanish Red Cross. Consequently, She has approached to the Institute the International Cooperation and Emergency Response in terms of water and sanitation, which could open new research lines at IMDEA Water Institute.

Developing my owns projects

Integration of recycled membranes in water process (Mem2.0). (University of Gerona) 2018-2020. PI: Joaquim Comas. Ref: TECSPRI17-1-0019 (**114,053.85€**). TecnioSpring Plus call co-funded by and ACCIO and the European Union's Horizon 2020 research and innovation programme, under the Marie Skłodowska-Curie grant agreement No 712949. The project has been 95% written by the applicant. **Post doctoral position granted.**

Transformation of end-of-life reverse osmosis membranes into nanofiltration and ultrafiltration membranes. (IMDEA AGUA). 2014-2018. PI: Eloy García Calvo. Ref: LIFE13 000751 TRANSFOMEM. **European project (954.977 €)**. Cofunded by European Community LIFE project, IMDEA Water, Sadyt and Valoriza Agua. **Participation percentage of the applicant: 95%. Technical responsible of the project.**

Experience of leadership outside academia

Volunteer Focal Point at National level of Emergency Response Unit in Water and Sanitation (ERU WATSAN) of Spanish Red Cross, since October 2015. I coordinate a group of 125 volunteers. The main activities she uses to develop are: communication by diverse tools (mail, [Slack tool](#), WhatsApp and Skype), coordination of working groups (using organization tools such as [Trello](#) for the working progress verification and Skype meetings for leader groups coordination), coordination and participation in annual courses and meetings (how to use the drinking water mobile plant for emergency response, laboratory practices for water analysis, Internal meeting of all emergency response units, etc.) and coordination with the Emergency Unit technical staff and manager.

2.4 Qualifications portfolio for innovation, entrepreneurship and external engagement

List of qualifications concerning innovation, entrepreneurship and external engagement

Patent

Spanish Patent PCT/EP2016/30931 (08 July 2016). García-Pacheco, R., Molina, S., Rodríguez-Sáez, L., Rabadán, J., Landaburu-Aguirre, J., Ortíz de Lejarazu, A., García Calvo, E., Campos, E., Terrero, P., Zarzo, D., Molina, P., Calzada, M. Proceso de transformación de membranas de poliamida con enrollamiento en espiral que han agotado su vida útil en membranas de utilidad industrial. In English: **Transformation of spiral wound polyamide membranes after its industrial lifespan**. Applicants: IMDEA Water (50%) and VALORIZA Water (50%).

The invention concerns the recycling of end-of-life RO and NF membranes into NF and UF membranes using two methodologies (passive immersion of membrane into a chlorine solution and active circulation of chlorine solution through the membranes). Main task: participation in designing of the pilot plants and designing of experiments that led to the creation of a free chlorine decision-making tree for recycling membranes according to membrane type (SW or BW water), membrane fouling and end-of-life membrane rejection. Fundamental research conducted during the PhD and supervision of experiments at pilot scale.

IP registration

Spanish IP Registration M-4232-15 11 January 2016 (IMDEA Water). Vivar, M., Fuentes, M, Aguilera, J., García-Pacheco, R., De Miguel, A. Gestión de un sistema híbrido fotovoltaico-eólico-diésel de generación de energía para plantas potabilizadoras móviles en situación de emergencia con carga continua, 24 h. de operación y uso nocturno sin generador diesel. In English: **Management of a Photovoltaic-Eolic-Diesel hybrid energy production system for drinking water emergency response mobile plants, with 24 continuous operation and nocturnal use without diesel generator**.

Main task of the applicant: literature review for writing the IP document, preliminary design of the mobile plant and operation with an additional membrane module.

Contribution to various media

- Interview to Raquel García Pacheco to disseminate Life-Transformem project results and give her opinion related to Women in Science University of Alcalá Radio-Postcast (16/02/2018). http://www.ivoox.com/cualquier-dia-339-dia-mujer-en-audios-mp3_rf_23813498_1.html

- Interview to Raquel García Pacheco after being participated at Bangladesh: Population Movement Operation. University of Alcalá Radio-Postcast (15/01/2018). http://www.ivoox.com/cualquier-dia-334-entrevista-a-raquel-garcia-audios-mp3_rf_23162002_1.html

- Interview at the membrane technology group in IMDEA Water. Canal orbe21 (28/12/2016, 21'40"). Online and television media. <http://www.agua.imdea.org/noticias/2016/como-afrentar-la-escasez-de-agua-conoce-algunas-de-las-propuestas-IMDEA-AGUA>

- Interview to Raquel García Pacheco as Volunteer Focal point of Water and Sanitation Emergency Response Unit. Canal orbe21 (28/12/2016). Online and television media. <http://www.agua.imdea.org/noticias/2016/como-afrentar-la-escasez-de-agua-conoce-algunas-de-las-propuestas-IMDEA-AGUA>

- Interview to Raquel García Pacheco as technical responsible of Life-Transformem project. Interview entitled "Spanish Life Project will develop a second industrial life for desalination membranes"

(26/03/2016) <http://www.efeverde.com/noticias/proyecto-life-espanol-desarrolla-una-segunda-vida-para-membranas-desaladoras/>

- Interview to Raquel García Pacheco to promote the Conferences series "Science for everybody" organized by the Cultural Service of the Avila headquarters of the University of Salamanca. La Ser Ávila (Spanish Regional Radio) on November 2014.

Dissemination and community manager of the European project Life-Transfomem (Since 2014)

Dissemination to reach general public engagement and to getting closer to wastewater, solid waste, drinking water and membrane manufactures clusters

Social nets and web

Managing Twitter <https://twitter.com/TRANSFOMEM>

Managing Facebook <https://www.facebook.com/pages/Life-Transfomem/759314547449284>

Managing Google+ <https://plus.google.com/b/107089782907123046850/107089782907123046850>

Managing LinkedIn <https://www.linkedin.com/company/life-transfomem/>

Managing [hootsuite tool](#) for monitoring and dissemination content of all social nets

Updating the website of Life-Transfomem project (<http://www.life-transfomem.eu/>) with more than **20,000 visits** (according to Google analytics). This includes writing news and dissemination articles for technical and general public (>**100 news** has been online published in diverse webs in 3 years according to the last progress report May 2017).

Creating dissemination videos:

- Membrane autopsy: conducting membrane autopsy and build up the video using i-movie (2086 visits at 28/11/2017). <https://www.youtube.com/watch?v=aweeQ22FX5A>

-Video inviting people to select our dissemination activity within the Researcher Night Program (250 visits) <https://www.youtube.com/watch?v=wlvBxgULmO4>

Project poster.

Design of technical content and structure. http://www.life-transfomem.eu/doc/publications/Poster_infoTRANSFOMEM_eng.pdf

Project Leaflets.

Design of technical content and structure. http://www.life-transfomem.eu/doc/publications/Folletos%20Transfomem_Ingle%CC%81s.pdf

Final workshop of Life-Transfomem project (program)

https://drive.google.com/file/d/1ztTLNd5VYeQ11FP1E4g_tDFtGXTqZ9Z/view

<https://drive.google.com/file/d/1abIQSFsy0D-jCIXKzAEgWoDM5Uj2WpUF/view>

Periodic newsletters to show to general public the project progress

Nº1 http://www.life-transfomem.eu/doc/publications/BOLETI%CC%81N%20n%C2%BA1_en.pdf

Nº2 http://www.life-transfomem.eu/doc/publications/BOLETI%CC%81N%202_en.pdf

Nº 3 http://www.life-transfomem.eu/doc/publications/NEWSLETTER%203_ENGLISH.pdf

Nº4 http://www.life-transfomem.eu/doc/publications/NEWSLETTER%204_EN.pdf

Nº5 http://www.life-transfomem.eu/doc/publications/NEWSLETTER%205_EN%202.pdf