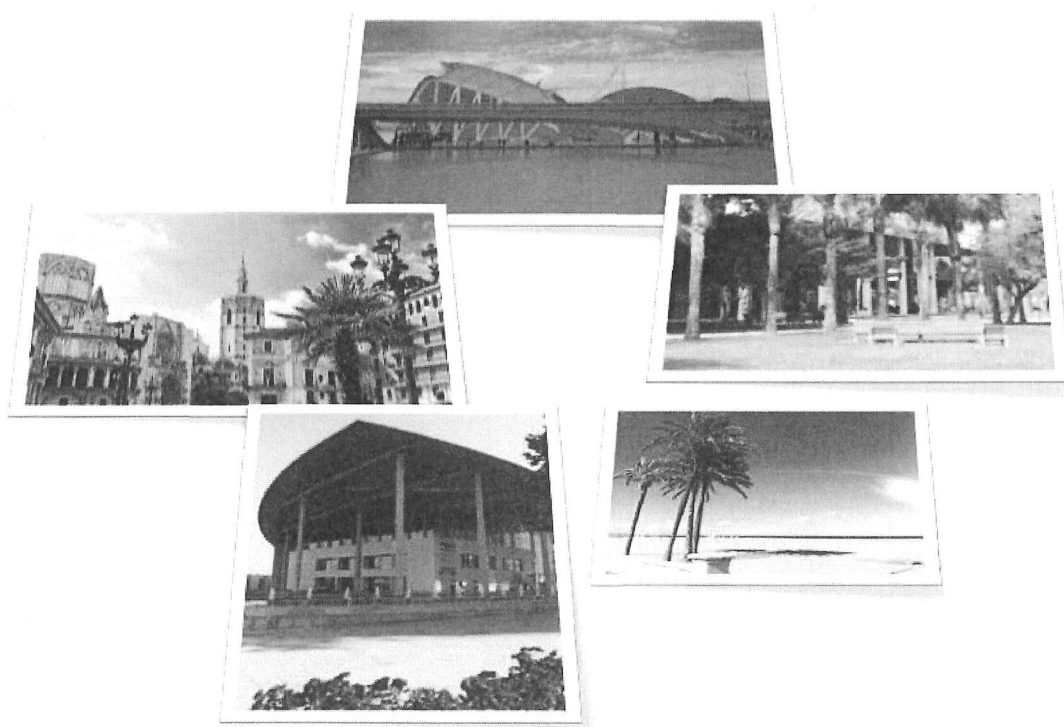


**Euromembrane 2018**  
July 9-13 Valencia

# BOOK OF ABSTRACTS



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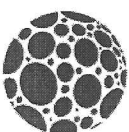
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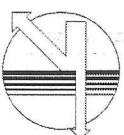
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Euromembrane 2018



EMS

ORAL PROGRAMME

Monday, 9<sup>th</sup> July 2018

Registration

20:00 Welcome Reception

Tuesday, 10<sup>th</sup> July 2018

8:30-8:45 Opening Ceremony

PLENARY LECTURE: Barriers to the Development of New Membrane. Gas Separation Applications.

Richard W. Baker (Membrane Technology and Research, Inc., U.S.A.)

Session chair: Joao G. Crespo, Auditorium 1

Location	Auditorium 1	Auditorium 2	Auditorium 3A	Auditorium 3B	Sala / Room 1+2
Topic	Patrick Meares Symposium	Gas & vapor separation I	Mixed matrix membranes I	Membrane reactors and bioreactors I	Micro-and Ultrafiltration I
Chairs	EMS council	P. Izak, A. Volkov	V. Chen, T. Schäfer	M. Menéndez, R. Wickramasinghe	A. Drews, M. Rabiller-Baudry
9:30-10:00		Keynote lecture 1: [199] A.Volkov*, I.Borisov, S.Bazhenov, P.M.Budd, V.Volkov. * A.V. Topchiev Institute of Petrochemical Synthesis RAS, Russia.	Keynote lecture 2: [1469] G. Mendes, M. Faria*, M. C. Gonçalves, M. N. de Pinho. *CEFEMA, Instituto Superior Técnico, Universidade de Lisboa, Portugal.	Keynote lecture 3: [1376] P. Durán, P. Ugarte, A. Sanz, J. Soler, M. Menéndez*, J. Herguido. * University of Zaragoza, Spain.	Keynote lecture 4: [723] A. Drews*, A. Heyse, N. Xander, T. Skale. * School of Life Science Engineering, Berlin, Germany.
10:00-10:20		[135] L.A. McNeil*, G.A. Mutch, E.I. Papaloannou, I.S. Metcalfe. * Newcastle University, United Kingdom.	[125] M. Shan*, B. Seoane, F. Kapteijn and J. Gascon. * Delft University of Technology, The Netherlands.	[1276] M.K. Jørgensen*, J.H. Sørensen, C.A. Quist-Jensen, M.L. Christensen. *Aalborg University, Denmark.	[1485] S. Liu, L. Villafañá López, E. Clavijo, P. Bourseau, M. Frappart, E. Couallier*. * Université de Nantes, France.
10:20-10:40	Patrick Meares Prize Symposium	[168] F. M. Benedetti*, E. Ricci, M. Carta, M. G. De Angelis, N. Mckeown. * University of Bologna, Italy.	[125] L. Upadhyaya*, Y Chiao, R Wickramasinghe, X Qian. * University of Arkansas, USA.	[333] J. Martín-Pascual*, G. Calero-Díaz, C. López-López, J. C. Torres, J. M-Poyatos. * University of Granada, Spain.	[498] M. Hartinger*, U. Kulozik. *Technical University of Munich, Germany.
10:40-11:00		[209] Zhongde Dai*, Qiang Yu, L. Ansaloni, S. Janakiram, Jing Deng and Liyuan Deng. * Norwegian University of Science and Technology, Norway.	[38] A. Abdel-Karim, S. Leaper*, M. Alberto, A. Vijayaraghavan, X. Fan, S.M. Holmes, E.R. Souaya, M. I. Badawy, P. Gorgojoa. * The University of Manchester, United Kingdom.	[70] A. R. Alkhrim*, A. B. Belisário, G. M. de Almeida, M. C. S. Amaral, S. M. A. C. Oliveira. *Federal University of Minas Gerais, Brazil.	[115] M. Le Hi*, Y. Wvart, G. Georges, L. Sizade, M. Sergent, P. Moulin. * Aix Marseille Université, France.
11:00-11:30		Coffee Break			

11:50-12:10	[767] C. Fontàs*, R. Vera, E. Anticó. *Universitat de Girona, Spain.	[747] V. H. Grisales Diaz* O. A. Prado-Rubio, M. J. Willis, M. von Stosch. *Newcastle University, United Kingdom.	[458] M. Jafari*, P. Desmond, M. Van Loosdrecht, C. Picioreanu. *Delft University of Technology, The Netherlands.	[581] N. Nady* *Egypt-Japan University of Science and Technology, Egypt.	[584] A. M. Malankowska, I. Julian, I. Pellejero, H. S. Rho, S. Schlautmann, R. M. Tiggelaar, M. P. Pina*, R. M. Mallada, H. Gardeniers. *University of Zaragoza, Spain.
12:10-12:30	[616] B. Ghalei*, V. Kimoshita, K. Sakurai, K. Wakimoto, E. Sivaniyah. *Kyoto University, Japan.	[795] J. M. Zielinski, S. A. Altinkaya*. *Izmir Institute of Technology, Turkey.	[153] M. Guate*, A. Ortiz, I. Ortiz. *Universidad de Cantabria, Spain.	[725] B. Diawara*, K. Fatyeyeva, S. Marais. *Laboratory Polymers Biopolymers and Surfaces (PBS), France.	[818] R. Melich*, F. Padilla, C. Charcosset. *Université Claude Bernard Lyon, France.
12:30-12:50	[842] D. A. Kennedy, T. Omar, F. H. Tezel*. *University of Ottawa, Canada.	[630] Y. Shi, X. Liu*, P. Dai, J. Guan, Y. Wang, T. D. Waite, G. Leslie. * University of New South Wales, Australia	[443] R. Guaccia*, S. Randazzo, D. Chilibra Martino, A. Cipollina, G. Micalè. Università degli Studi di Palermo, Italy.	[652] C. Rey, N. Hengli*, S. Baup, A. Dufresne, H. Djeridi, F. Pignon. *Université Grenoble Alpes, France.	[798] S. Morelli*, A. Pisciomeri, S. Salerno, C. C. Chen, L. Giorno, E. Drifoli, L. De Bartolo. *Institute on Membrane Technology, Italy.
13:00-14:30	<b>Lunch</b>				
<b>Topic</b>	<b>Membranes for wastewater treatment II</b>	<b>Emerging membrane science and technology I</b>	<b>Facilitated transport</b>	<b>Membrane contactors I</b>	<b>Inorganic membranes I</b>
<b>Chairs</b>	B. van der Bruggen, Y. Zhang	C. Boi, A. Cipollina	M. Barboiu, I. Vorotyntsev	D. Mattia, I. Ortiz	C. Algieri, S. Mestre
14:30-14:50	[73] Y. He*, Y. P. Tang, D. Ma, T. S. Chung. *National University of Singapore, Singapore.	[61] L. E. Koloti, N. P. Gule, O. A. Arotiba, S. P. Malinga*. *University of Johannesburg, South Africa.	[828] A. I. Akhmetshina, A. A. Atiasikin, A. V. Vorotyntsev, A. Mecherugui, I. V. Vorotyntsev*. *Nizhny Novgorod State Technical University, Russia.	[65] J. C. Obrien, E. Ekanem, J. L. Scott, D. Mattia*. *University of Bath, United Kingdom.	[124] M. D. Palacios, M. J. Orts, E. Sánchez, S. Mestre*. Universidad Jaume I, Spain.
14:50-15:10	[187] E. A. Grushvenko*, I. A. Podtynnikov, V. V. Volkov, I. L. Borisov. *A. V. Topchiev Institute of Petrochemical Synthesis, Russia.	[332] K. Remmen*, R. Schäfer, T. Wintgens, M. Lenz, M. Wessling. *Fachhochschule Nordwestschweiz, Switzerland.	[7] M. Barboiu*. *Institut Européen des Membranes, France.	[243] S. T. Houliker*, M. Pidou, E. J. McAdam. *Cranfield University, United Kingdom.	[8] J. Lee*, J. K. Ha, I. H. Song. *Korea Institute of Materials Science, South Korea.
15:10-15:30	[604] F. Ricceri, M. Giagnorio*, A. Triaferrì. *Politecnico di Torino, Italy	[93] M. Inês G. S. Almeida*, R. W. Cattrall, S. D. Kolev. *The University of Melbourne, Australia.	[676] R. Rea*, M. G. De Angelis, M. Giacinti Baschetti. *Università di Bologna, Italy.	[682] C. A. Quist-Jensen*, J. M. Sørensen, A. Svenstrup, L. Scarpa, T. S. Carlsen, H. C. Jensen, L. Wybrand*, M. L. Christensen. *Aalborg University, Denmark.	[193] I. Kistner, A. Schulz, C. Rösler*, T. Schiestel. *Fraunhofer IGB, Germany.
15:30-15:50	[555] B. Cristóvão*, R. Janssens, J. Torrejais, P. Luis, B. V. der Bruggen M. R. Bronz, J. G. Crespo, V. J. Pereira. *Universidade Nova de Lisboa, Portugal.	[178] B. A. Pulido*, S. Chisca, S. P. Nunes. *King Abdullah University of Science and Technology, Saudi Arabia.	[701] N. Varol*, K. Fatyeyeva, E. Dargent. *Université de Rouen Normandie, France.	[714] K. Rahaoui*, F. Abdullah, R. Alhindawi, L. C. Ding, A. Date, A. Akbarzadeh, M. Khayet. *RMIT University, Australia.	[241] N. Kruse*, G. Braun, J. U. Reple. *TH Köln, Germany.

[124] Ink-jet technology applied to engineer low- cost ceramic membranes

M.D. Palacios\*, M.J. Orts<sup>\*,\*\*</sup>, E. Sánchez<sup>\*,\*\*</sup>, S. Mestre<sup>\*,\*\*</sup>

\* University Institute of Ceramic Technology. Universidad Jaume I. Castellón. Spain.

\*\* Chemical Engineering Department. Universidad Jaume I. Castellón. Spain.

**Keywords:** Ceramic membranes, low cost materials, ink-jet technology.

### Short Introduction

A major challenge is the synthesis of ceramic membranes from unexpensive materials and manufactured with a unique high-flexibility method which allows the control of the spatial distribution of components (ceramic material and, optionally, pore generators or active substances as catalysts). The use of economic raw materials has been broadly investigated (Lorente-Ayza, 2015). However, a unified method for the application of the successive layers over the support is an open question.

Ink-jet technology can be an option as it allows to deposit very thin layers of a few micrometers on a substrate. Print variables, such as droplet size or print speed influences on the homogeneity of the deposited layer. The pore size distribution of the applied layer is also related to droplet size and the particle size of the solids, since the solid present in the ink will be what remains after the specimen is sintered. Deposition on the substrate surface is quite accurate, allowing to distribute different materials in programmed points of the surface, according to a previously defined pattern in a digital file (Pan, 2015).

This contribution analyses the suitability of the ceramic ink-jet technology to apply layers over a porous ceramic support, as the basis for a development of a standardized method to synthesize multilayer ceramic membranes.

### Material and Methods

The ceramic supports were synthesized from a mixture of clay, chamotte, calcium carbonate and starch. The raw materials were mixed with water and the supports were shaped by extrusion. After drying, the supports were sintered at 1200 °C.

The raw material for the ceramic ink was the same clay of the support, but previously calcined at 700 °C for two hours. This thermal treatment changes the behaviour of the clay, allowing an easier milling to the desired particle size and a better interaction with the liquid fraction of the ink (mainly an organic ester and some rheological additives). The ink was prepared in an agitator bead mill working at 3500 r.p.m. during 180 min (LabStar, Netzsch GmbH, Germany). The particle-size distribution parameters of the solid present in the ink were  $d_{10}= 0,248 \mu\text{m}$ ,  $d_{50}= 0,672 \mu\text{m}$  and  $d_{90}= 1,833 \mu\text{m}$ . This ink was applied over the support with a laboratory ink-jet printer (Dimatix DMP-2800 Fujifilm Corp. Japan). The samples were sintered at temperatures lower than the one used to sinter the support.