

11<sup>th</sup> International Symposium on the

# Characterization of Porous Solids

Avignon (France), 14<sup>th</sup>-17<sup>th</sup> May, 2017



## Program & List of Abstracts



## Sponsors



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## Introductory remarks

The 11<sup>th</sup> International Symposium on the Characterization of Porous Solids (COPS-XI) in Avignon (France) is the latest of a series of symposia, held every 3 years, devoted to fundamental and applied research on the characterization of the structure of porous materials and the relationship between structure and material performance.

The scope includes

- **experimental characterization methods**, such as X-ray diffraction, NMR, adsorption, mercury intrusion, calorimetry ...
- **theoretical and simulation methods** used to interpret experimental data, such as molecular simulation, classical and statistical mechanical theory, pore network modeling ...
- **applied research**, on the impact of measured material properties on performance in applications

The aim of this series of symposia is to bring together experts from academia and industry in order to share the latest developments in the characterization of porous solids using the various experimental and/or computational methods, together with the understanding of the relationships between the measured material properties and the final performance for a given application.

## Conference History

### Leading up to the COPS series

The importance of porosity has long been recognized by scientists and engineers. Indeed, probably the first major symposium on "The structure and properties of porous materials" was held in 1958 at Bristol University (UK) under the auspices of the Colston Research Society. To other symposia of note were on the "Characterization of porous solids" (University of Neuchatel, Switzerland, in 1978) and "Principals and applications of pore characterization" (Milan, Italy, in 1983).

### The IUPAC sub-committee on the characterization of porous solids and 'COPS-I'

To establish the future continuity on the subject, the IUPAC decided to set-up a sub-committee on the characterization of porous solids. The first action of this sub-committee was to arrange for a series of symposia to be held at regular intervals. The first of these symposia, 'COPS-I', was organized by Professor D. Behrens and Dr. H Kral, and was held in Bad Soden (Germany) in 1987. The first symposium chairman was Professor Klaus Unger. 255 participants from 29 different countries attended this first symposium.

### COPS-II onwards

Following the success of COPS-I, a scientific committee of Francesco Rodriguez-Reinoso, Jean Rouquerol, Ken Sing and Klaus Unger undertook the organization of following symposia.

COPS-II was organized by Francesco Rodriguez-Reinoso with the aim to encourage a wide range of scientists and technologists in the fields of theoretical, experimental and applied research to meet. This symposium was organized in Alicante (Spain) in 1990.

COPS-III was held in Marseille (France) in 1993 and was chaired by Jean Rouquerol

COPS-IV was held in Bath (UK) in 1996 and was chaired by Brian McEnaney

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COPS-V was held in Heidelberg (Germany) in 1999 and was chaired by Klaus Unger

COPS-VI was again held in Alicante in 2002 and was chaired by Francesco Rodriguez-Reinoso

COPS-VII was held in Aix-en-Provence (France) in 2005 and was chaired by Philip Llewellyn

COPS-VIII was held in Edinburgh (UK) in 2008 and was chaired by Nigel Seaton

COPS-IX was held in Dresden (Germany) in 2011 and was chaired by Stefan Kaskel

COPS-X was held in Grenada (Spain) in 2014 and was chaired by Joaquin Silvestre-Albero

The current conference will be the 11<sup>th</sup> in the series with still the basic aim to to "encourage a wide range of scientists and technologists in the fields of theoretical, experimental and applied research to meet".

## Program at a glance

14 <sup>th</sup> May, 2017	15 <sup>th</sup> May, 2017	16 <sup>th</sup> May, 2017	17 <sup>th</sup> May, 2017
	08:00 Tutorial Adsorption J. Kenvin	08:00 Tutorial Modeling F.-X. Coudert	08:00 Short updates
	09:00 Invited Lecture X. Zou	09:00 Invited Lecture A. Goodwin	09:30 Invited Lecture R. Pellenq
	09:40 Oral Session # 1 L. Sarkisov 10:00 K. Kaneko	09:40 Oral Session # 4 C. Nieto-Draghi 10:00 S. Rigby	10:10 Oral Session # 8 J. Matos 10:30 R. Kaldenhoven
	10:20 Coffee	10:20 Coffee	10:50 Coffee
	11:00 Oral Session # 2 J. Rouquerol 11:20 M. Thommes 11:40 Th. Steriotis 12:00 C. Ania 12:20 C. Fernandez	11:00 Oral Session # 5 K. Gubbins 11:20 L. Borchardt 11:40 S. Rochat 12:00 M. Russina 12:20 G. Maurin	11:20 Oral Session # 9 O. Cherkas 11:40 G. Gor 12:00 A. Ayrat 12:20 Closing Ceremony

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		12:4 0 LUNCH	12:4 0 LUNCH	12:3 0 LUNCH
14:0 0	Registration	14:0 0 <b>Poster session # 1</b>	14:0 0 <b>Poster session # 3</b>	
		<b>Oral Session # 3</b>	<b>Oral Session # 6</b>	
15:0 0		S. Kaskel	15:0 0 S. Wells	
15:2 0		P. Ravikovitch	15:2 0 L. Chen	
15:4 0		J. Silvestre-Albero	15:4 0 A. Kondo	
16:0 0	I. Senkovska	16:0 0 J. Denayer		
16:2 0	C. Balzer	16:2 0 <b>Coffee</b>		
16:4 0	A. Fuchs	<b>Oral Session # 7</b>		
17:0 0		17:0 0 K. Walton		
		17:2 0 S. Hiraide		
17:1 0	<b>Opening</b>	17:4 0 A. Neimark		
17:3 0	Homage to Ken Sing	18:0 0 A. Slawek		
18:0 0	<b>Reception</b>	19:3 0 <b>Aperitif</b>		
		20:3 0 <b>Conference diner</b>		

## Program

Sunday 14<sup>th</sup> May

14:00 – 18:00                      Registration Open  
*Possibility to visit the Palais des Papes with Audioguide for those arriving  
before 16:00*

## Opening Ceremony, Benoit XII Cellar

17:00 – 17:15                      Welcome and Introduction

17:15 – 18:00                      **Homage to Kenneth S.W. Sing**  
F. Rodriguez-Reinoso, J. Rouquerol, K. Unger

18 :00 – 20 :00                      Welcome Reception in the Benedict XII Cloiser

## Program

### Monday 15<sup>th</sup> May

8:00 – 8:50	T1	<b>Tutorial “Adsorption”</b> J. Kenvin. <i>Micromeritics-USA</i>
9:00 – 9:40	K1	Keynote #1. Chair : Joachim Silvestre-Albeiro, <i>Univ. Alivante-Spain</i> <b>Structural characterization of zeolites and metal-organic frameworks by electron microscopy</b> X. Zou. <i>Stockholm Univ.-Sweedden</i>
9:40 - 10:00	O1	Oral Session #1. Water <b>Molecular simulation and experiments of water adsorption in a high surface area activated carbon: hysteresis, scanning curves and spatial organization of water clusters</b> <u>L. Sarkisov</u> , A. Centineo, A.H. Farmahini, S. Brandani, <i>Univ. Edinburgh-UK</i>
10:00 – 10:20	O2	<b>Isotope effect on water adsorption on hydrophobic carbons of different nanoporosities</b> <u>Y. Ono</u> , T. Sakai, Y. Hattori, R. Futamura, K. Kaneko. <i>Shinshu Univ.-Japan</i>
10:20 – 11:00		Coffee Break with Exhibitors and Posters
11:00 – 11:20	O3	Oral Session #2. Characterization Chair : Isabelle Beurroies. <i>Aix-Marseille Univ.</i> <b>Looking for a meaningful surface area in high-pressure adsorption</b> <u>J. Rouquerol</u> , F. Rouquerol, P. Llewellyn, G. Maurin, R. Denoyel, <i>CNRS/AMU-Marseille</i>
11:20 – 11:40	O4	<b>Systematic study of the adsorption and phase behaviour of CO<sub>2</sub> in ordered micro-mesoporous carbons from below the triple point up to supercritical conditions: Towards an advanced pore structural characterization</b> K.A. Cychosz, F.S.P. Dantas, R.T. Cimino, A.V. Neimark, <u>M. Thommes</u> , <i>Quantachome-USA</i>
11 :40 – 12 :00	O5	<b>Depletion of Pore-Confined CO<sub>2</sub> below the Bulk Triple Point</b> C. Tampaxis, A. Sapalidis, K. Stefanopoulos, F. Katsaros, D. Bowron, T. Youngs, M. Thommes, <u>Th. Steriotis</u> . <i>DEMOKRITOS-Greece</i>
12 :00 – 12 :20	O6	<b>Sequential scanning of the hysteresis loop of mesoporous carbon gels for an advanced characterization</b>



- A. Gomis-Berenguer, J.B. Parra, C.A. Czychosz, M. Thommes, C.O. Ania. *CNRS/Orleans-France*
- On the Recrystallization of Hierarchical Zeolites using Pore Directing Agents**
- 12 :20 – 12 :40 O7 E. Dib, H. El Siblani, B. Rigaud, S. M.Kunjir, A. Vicente, D. Verboekend, N. Muttens, B.F. Sels, C. Fernandez. *CNRS ENSICAEN LCS-France*
- 12:40 – 14:00 Lunch Break
- 14:00 – 15:00 Poster Session #1.
- Oral Session #3. Compliance  
Chair : Gino Baron. *VUB-Belgium*
- Negative Gas Adsorption Transitions in a Metal-Organic Framework**
- 15:00 – 15:20 O8 V. Bon, F.-X. Coudert, J. Evans, S. Krause, G. Maurin, R.S. Pillai, I. Senkowska, D. Wallacher, S. Kaskel. *Fraunhofer/Dresden-Germany*
- Characterization and Prediction of Flexibility in Zeolitic Imidazolate Frameworks by Molecular Simulations**
- 15:20 – 15:40 O9 P.I. Ravikovitch, Y. Du, J. Falkowski, C.S. Paur. *EXXON-USA*
- Breathing effects in ZIF-7 upon gas adsorption: A synchrotron XRD study**
- 15:40 – 16:00 O10 J. Hernández-Català, C. Cuadrado-Collados, E.V. Ramos-Fernández, J. Silvestre-Albero. *Univ. Alicante-Spain*
- Dualistic adsorption behavior of switchable MOF**
- 16:00 – 16:20 O11 V. Bon, N. Kavoosi, I. Senkowska, S. Kaskel. *TU Dresden*
- Structural and Mechanical Characterization of Carbon Xerogels by Gas Adsorption with in-situ Dilatometry**
- 16:20 – 16:40 O12 C. Balzer, G. Reichenauer, G.Y. Gor, R. T. Cimino, A.V. Neimark. *ZAE Bayern-Germany*
- Mechanical Impact of Adsorption in Compliant Nanoporous Materials**
- 16:40 – 17:00 O13 F. Mouhat, D. Bousquet, A. Boutin, F.-X. Coudert, A. H. Fuchs. *CNRS/Paris-France*
- 17:00 – 19:00 Poster Session #2.
- 19:00 End of the 1<sup>st</sup> Conference Day

## Program

### Tuesday 16<sup>th</sup> May

- 8:00 – 8:50 T2 **Tutorial “Modeling and Simulation”**  
F.-X. Coudert. *Chimie Paris Tech.-France*
- 9:00 – 9:40 K2 **Keynote #1. Chair : Stefan Kaskel**  
**Diffuse scattering from disordered MOFs**  
A. Goodwin. *Univ. Oxford-UK*
- 9:40 – 10:00 O14 **Oral Session #4. Structure-Property Relationships**  
**New descriptors to characterize porous materials**  
C. Nieto-Draghi, B. Creton, X. Martin, M. Moreaud, J. Chaniot. *IFPEN-France*
- 10:00 – 10:20 O15 **Structure-transport Relationships in Disordered Materials using Fully-integrated Rate of Gas Sorption, Mercury Porosimetry and X-ray Imaging**  
S.P. Rigby, A. Nepryahin. *Univ. Nottingham-UK*
- 10:20 – 11:00 Coffee Break with Exhibitors and Posters
- 11:00 – 11:20 O16 **Oral Session #5. Pressure**  
Chair : Alexander Neimark. *Rutgers Univ.-USA*  
**Confinement-Induced High Pressure Phases In Nanopores**  
C.K. Addington, Y. Long, D. Srivastava, E.E. Santiso, M. Śliwiska-Bartkowiak, K.E. Gubbins. *NCSU-USA*
- 11:20 – 11:40 O17 **Solid gas storage in confined spaces - methane hydrate formation in porous model carbons**  
L. Borchardt, J. Silvestre-Albero. *TU Dresden-Germany*
- 11:40 – 12:00 O18 **Polymer-based porous composites for hydrogen storage**  
S. Rochat, M. Tian, K. Polak-Kraśna, L.T. Holyfield, A.D. Burrows, C.R. Bowen, T.J. Mays. *Univ. Bath-UK*
- 12:00 – 12:20 O19 **Hydrogen storage enhanced by structural contraction? In-situ neutron scattering study of CAU-1 metal organic framework**  
M. Russina, M.-C. Schlegel, D. Töbrens, R. Svetogorov, M. Krüger, N. Stock, H. Reinsch, D. Wallacher, R. Stewart. *Helmholtz Zentrum Berlin-Germany*
- 12:20 – 12:40 O20 **Understanding of spectacular gas separation phenomena in Metal-Organic Frameworks**  
R.S. Pillai, J.W. Yoon, Y. Belmabkhout, K. Adil, H. Chang, Y. Jung, J.S. Chang, M. Eddaoudi, G. Maurin. *Univ. Montpellier-France*
- 12:40 – 14:00 Lunch Break
- 14:00 – 15:00 Poster Session #3.

Oral Session #6. Discovery

Chair : Katsumi Kaneko. *Shinshu Univ.-Japan*

- 15:00 – 15:20 O21 **Modelling MOF Self-Assembly and Growth**  
S.A. Wells, G. Donval, M. Peskov, N.F. Cessford, T. Düren. *Univ. Bath-UK*
- Computer Aided Materials Discovery and Design of Porous Organic Molecular Crystals**
- 15:20 – 15:40 O22 L. Chen, A. Pulido, D. Holden, D.P. McMahon, S.Y. Chong, B.J. Slater, M.A. Little, C.J. Stackhouse, A. Stephenson, C.M. Kane, R. Clowes, T. Hasell, G.M. Day, A.I. Cooper. *Univ. Liverpool-UK*
- Nano-room in a new copper-based MOF**
- 15:40 – 16:00 O23 A. Kondo, T. Yashiro, N. Okada, T. Ohkubo, S. Hiraide, H. Tanaka, K. Maeda. *Tokyo Univ. Agricult. & Tech.-Japan*
- Crystal and Particle Engineering of ZIF-8 MOF: Characterization of Textural, Diffusion, Adsorption and Separation Properties**
- 16:00 – 16:20 O24 S. Tanaka, J. Cousin Saint Remi, G.V. Baron, J.F.M. Denayer. *VUB-Belgium*
- 16:20 – 17:00 Coffee Break with Exhibitors and Posters
- Oral Session #7. Energy
- Chair : Daniel Siderius. *NIST-USA*
- Synergistic Effects of Water and SO<sub>2</sub> on Degradation of MIL-125 in the Presence of Acid Gases**
- 17:00 – 17:20 O25 W. P. Mounfield III, C. Han, S.H. Pang, U. Tumuluri, Y. Jiao, S. Bhattacharyya, M.R. Dutzer, S. Nair, Z. Wu, R.P. Lively, D. S. Sholl, K.S. Walton. *Georgia Tech-USA*
- Theoretical study of intrinsic thermal management capability for CO<sub>2</sub> capture with metal-organic framework**
- 17:20 – 17:40 O26 S. Hiraide, N. Ishikawa, H. Tanaka, M.T. Miyahara. *Kyoto Univ.-Japan*
- Determination of Isothermic Heat by Quenched Solid Density Functional Theory**
- 17:40 – 18:00 O27 R.T. Cimino, P. Kowalczyk, P.I. Ravikovitch, A.V Neimark. *Rutgers Univ.-USA*
- Isobaric Approach to Adsorption: Quasi-Equilibrated Thermodesorption Combined with Molecular Simulations**
- 18:00 – 18:20 O28 A. Sławek, J. M. Vicent-Luna, B. Marszałek, W. Makowski, S. Calero. *Jagiellonian Univ.-Poland*
- 19:00 End of the 2<sup>nd</sup> Conference Day
- 19:30 Appetisers at the Saint Bénézet Bridge
- 20:30 Conference Dinner at the Jeanne Laurent Building

## Program

### Wednesday 17<sup>th</sup> May

		<b>Short updates</b>
8:00 – 9:20	T3	TBA D. Siderius. <i>NIST-USA</i>
9:30 – 10:10	K3	Keynote #3. Chair : Tina Düren. <i>Univ. Bath-UK</i> <b>The (Porous) Multi-Scale Texture of Cement Hydrate</b> K. Ionnidou, F.-J. Ulm, E. Del Gado, <u>R. Pelleng</u> . <i>MIT/CNRS-USA</i>
		Oral Session #8. Methods (1)
10:10 – 10:30	O29	<b>Eco-friendly methodology for the synthesis of nanoporous graphene-based catalytic membrane reactors</b> <u>J. Matos</u> , A.G. Souza-Filho, E. Barros, J.A. Rodriguez, M.C. Fernández de Córdoba, C.O. Ania. <i>Univ. Concepcion-Chile</i>
10:30 – 10:50	O30	<b>Pore Structure of Activated Carbon from Petroleum Coke</b> <u>R. Kaldenhoven</u> , J.M. Hill. <i>Univ. Calgary-Canada</i>
10:50 – 11:20		Coffee Break with Exhibitors and Posters
		Oral Session #9. Methods (2) Chair : Renaud Denoyel. <i>CNRS/AMU-France</i>
11:20 – 11:40	O31	<b>3-Dimensional Imaging of porosity in CaCO<sub>3</sub> particles by coherent X-ray diffraction imaging</b> <u>O. Cherkas</u> , T. Beuvier, D.W. Breiby, F. Zontone, Y. Chuskin, A. Gibaud. <i>Univ. Maine-France</i>
11:40 – 12:00	O32	<b>Elastic Properties of Confined Fluids and their Application for Characterization of Porous Materials</b> <u>G. Y. Gor</u> . <i>New Jersey Inst. of Tech.-USA</i>
12:00 – 12:20	O33	<b>Better characterization of microporous organosilica films through combining ellipsometric porosimetry and molecular simulation</b> M. Lépinay, L. Broussous, C. Licitra, F. Bertin, V. Rouessac, <u>A. Ayral</u> , B. Coasne. <i>Univ. Montpellier-France</i>
12:20 – 12:30		Closing Ceremony
12:30 – 14:00		Lunch
14:00		End of the Conference

## COPS-XI : Poster listing

- 
- P1 **Adsorption and kinetics of sulfur dioxide at different carbon materials: SWCNTs, MWCNTs, VACNTs, carbon nano horns, activated carbons, and exfoliated graphene oxide**  
F.G. Kühl \*, T.J. Kazdal, M.J. Hampe. *TU Darmstadt-Germany*
- 
- P2 **Synthesis and characterization of B-substituted nanoporous carbons with high energy of hydrogen adsorption**  
K. Walczak \*, M-V. Coulet, T. Neisius, C. Journet-Gautier, Ph. Llewellyn, A. Gillespie, A.J. Smith, P. Pfeifer, B. Kuchta, L. Firlej. *Univ. Montpellier-France*
- 
- P3 **CO<sub>2</sub> Adsorption on Activated Carbons Prepared by Chemical Activation with Fe(III) Solutions**  
S. Acevedo \*, L. Giraldo, J.C. Moreno-Piraján, *Univ. Nacional de Colombia-Colombia*
- 
- P4 **Adsorption of n-pentane on activated carbons modified in its surface**  
A.M. Carvajal-Bernal \*, F. Gómez, L. Giraldo, J.C. Moreno-Piraján, *U. Nacional de Colombia*
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- P5 **CO<sub>2</sub> Capture by Activated Carbon from Polyethylene Terephthalate**  
P.A.S. Moura, E. Vilarrasa-Garcia, D.A.S. Maia, C.O. Ania, J.B. Parra, M. Bastos-Neto, D.C.S. Azevedo \*. *Univ. Federal do Ceará-Brasil*
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- P6 **Intensive Hygroscopic Nature of Hydrophobic-like Nanodiamonds**  
E. Z. Pina-Salazar, R. Kukobat, R. Futamura, T. Hayashi, K. Urita, I. Moriguchi, F. Vallejos-Burgos, E. Osawa, K. Kaneko \*. *Shinshu Univ.-Japan*
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- P7 **The NIST/ARPA-E Database of Novel and Emerging Adsorbent Materials: An Online Infrastructure for Cataloging and Curating Adsorbent Materials, Data, and Properties**  
D. W. Siderius \*, V. K. Shen, R. D. Johnson III, and R. D. van Zee. *NIST-USA*
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- P8 **Understanding ZIF-8 performance upon gas adsorption: Has Inelastic Neutron Scattering (INS) the answer?**  
E.V. Ramos-Fernandez \*, M.E. Casco, J. Fernández-Catalá Y.Q. Cheng, L.L. Daemen, A.J. Ramirez-Cuesta, C. Cuadrado-Collados, J. Silvestre-Albero. *Univ. Alicante-Spain*
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- P9 **A Density Functional Theory Computational Study of Alkali Cation-Exchanged sod-ZMOF for CO<sub>2</sub>, N<sub>2</sub>, and CH<sub>4</sub> Adsorption**  
J. Shang \*, G. Li, P.A. Webley, J.Z. Liu. *City Univ. Hong Kong-Hong Kong SAR*
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- P10 **CO<sub>2</sub> capture using the SIFSIX-2-Cu-i metal-organic framework: A computational approach**  
I. Skarmoutsos \*, Y. Belmabkhout, K. Adil, M. Eddaoudi, G. Maurin. *Univ. Montpellier*
- 
- P11 **Evaluation of the effect of humidity on CO<sub>2</sub> adsorption performance in nanoporous materials**  
N. Chanut, S. Bourrelly \*, B. Kuchta, P. L. Llewellyn. *Aix-Marseille Univ.-France*
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- P12 **Substituted Isophthalic acid MOFs for the Removal of Toxic Chemicals from Contaminated Airstreams**  
L. N. McHugh \*, R.E. Morris, M.W. Smith and C.A. Stone. *Univ. St. Andrews-UK*
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- P13 **A contribution to the mechanism of water adsorption in the large pore form of the gallium-based MIL-53 Metal-Organic Framework**  
G. Weber \*, I. Bezverkhy, J.-P. Bellat, A. Ballandras, G. Ortiz, G. Chaplais, J. Patarin, F.-X. Coudert, A.H. Fuchs, A. Boutin. *Univ. Bourgogne-France*
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- P14 **Evaluation of PIM-1/MIL-101 Composites for Use in a Hybrid High Pressure Hydrogen Storage System**  
L.T. Holyfield \*, N. Weatherby, A.D. Burrows, T.J. Mays. *Univ. Bath-UK*
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- P15 **Surface modified titania: influence of aromatic properties on adsorption**  
J.G. Van Dijck \*, M. Dorbec, V. Meynen. *Univ. Antwerp-Belgium*
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- P16 **Workplace exposure to nanomaterials during powder handling: Relationships between powder properties and airborne particle characteristics**  
C. Dazon \*, S. Bau, O. Witschger, P. Llewellyn. *INRS-France*
- P17 **Influence of SBA-15 Synthesis Temperature on the Pore Size Distribution, Amine Functionalization and CO<sub>2</sub> Adsorption**  
J.A. Cecilia, E. Vilarrasa-Garcia, C.L. Cavalcante Jr., D.C.S. Azevedo, E. Rodríguez-Castellón \*. *Univ. Málaga-Spain*
- P18 **On Adsorption Hysteresis in Closed-end Pores: Isotherm Reconstruction and Free Energy Analysis via Flat-histogram Monte Carlo Simulation**  
D.W. Siderius \*, V.K. Shen. *NIST-USA*
- P19 **Gas Adsorption in Mesoporous-Silica Ionic Liquid Composites**  
T.G Glover \*, K.N. Ruckart, K.N. West. *Univ. S. Alabama*
- P20 **Enhanced CO<sub>2</sub> Adsorption Efficiency over Supported Polyethylenimine**  
A. Sayari \*. *Univ. Ottawa-Canada*
- P21 **Characterization of Graphene-Wrapped Zeolites**  
R. Kukobat \*, F. Vallejos-Burgos, R. Futamura, K. Kaneko. *Shinshu Univ.-Japan*
- P22 **Evolution of textural and functional properties of activated carbons subjected to severe storing conditions**  
Y. Boutillara \*, P. Lodewyckx, G. De Weireld. *Univ. Mons-Belgium*
- P23 **Influence of temperature and pH on the stability in water of MIL-53 and MIL-100 frameworks**  
I. Bezverkhyy \*, G. Weber, J.-P. Bellat. *Univ. Bourgogne-France*
- P24 **Syngas production by catalytic steam reforming of methane on NiO/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalysts based on microwave irradiations heating method**  
N.Salhi \*, S.Benadji, M.Boudjeloud, A.Saadi, C.Rabia. *Univ. Blida-Algeria*
- P25 **Exploring CO<sub>2</sub> Reduction on Heteroatom Doped Nanoporous Carbons**  
W. Li ,T.J. Bandosz \*. *City College of New York-USA*
- P26 **Microporous metal-organic frameworks for selective CO<sub>2</sub> adsorption and heterogeneous catalysis**  
M. Almáši \*, V. Zeleňák, M. Opanasenko, S. Bourrelly. *P. J. Šafárik Univ.-Slovak Republic*
- P27 **Method for the determination of the surface composition of alloy nanocrystallites in bimetallic catalysts**  
J. Mahy, C. Wolfs, J. Geens, S.D. Lambert \*. *Univ. Liege-Belgium*
- P28 **Temperature effect on isopropanol decomposition reaction to DIPE based on H<sub>4</sub>PMO<sub>11</sub>VO<sub>40</sub>/HMS catalyst**  
N.Salhi \*, M. Boudjeloud, S. Benadji, A. Saadi, C. Rabia. *Univ. Blida-Algeria*
- P29 **Cavitation in metastable fluids confined to linear mesopores Influence of confinement on the cavitation process**  
A. Grosman \*, E. Rolley, J. Puibasset. *Univ. Paris 6-France*
- P30 **Nanostructure Characterization of Carbide-derived Carbons by Morphological Analysis of Transmission Electron Microscopy Images Combined with Physisorption and Raman Spectroscopy**  
M. Oschatz \*, P. Pré, W. Nickel, P. Beaunier, S. Kaskel. *TU Dresden-Germany*
- P31 **Characterization of Porous Glass using CO<sub>2</sub> Adsorption on Perfect and Defective Surfaces of Slit Pore: Computer Simulation Study**  
C. Boonfung, N. Ketprasoet, C. Tangsathitkulchai, A. Wongkoblap \*. *Suranaree Univ.-Thailand*

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