41ª Reunión Ibérica de Adsorción

3er Simposio Iberoamericano de Adsorción

5-7 septiembre/setembro/September 2018 · Gijón, Asturias (España)

ABSTRACTS BOOK

41ª Reunión Ibérica de Adsorción - 3er Simposio Iberoamericano de Adsorción

41ª Reunião Ibérica de Adsorção - 3º Simpósio Ibero-Americano de Adsorção

41st Iberian Adsorption Meeting - 3rd Iberoamerican Adsorption Symposium

Palacio de Congresos de Gijón, Sala Anfiteatro

Recinto Ferial Luis Adaro, Gijón

5-7 Septiembre/Setembro/September 2018

Organized by:

COMMITTEES

GRUPO ESPECIALIZADO DE ADSORCIÓN RSEQ

www.adsorcion.com

41RIA-IBA3 CHAIR

Conchi Ania

CEMHTI-CNRS (Orléans, France)

INCAR-CSIC (Oviedo, Spain)

41RIA-IBA3 Vice-CHAIR

Eva Díaz

Universidad de Oviedo

(Oviedo, Spain)

41RIA-IBA3 SCIENTIFIC SECRETARY

Teresa Valdés-Solís

Instituto Nacional del Carbón, INCAR-CSIC (Oviedo, Spain)

41RIA-IBA3 ORGANISING COMMITTEE

Sofía Calero	Universidad Pablo de Olavide, Spain
Amaro Gomes Barreto	Universidade Federal do Rio de Janeiro, Brazil
Alicia Gomis Berenguer	CEMHTI-CNRS, France
Ana S. Mestre	Universidade de Lisboa, Portugal
José B. Parra	INCAR-CSIC, Spain

41RIA-IBA3 INTERNATIONAL SCIENTIFIC COMMITTEE

Conchi Ania (France/Spain)
Teresa Bandosz (USA)
Elena Basaldella (Argentine)
Sofía Calero (Spain)
Guillermo Calleja (Spain)
Francisco Carrasco Marín (Spain)
Ana Paula Carvalho (Portugal)
Eva Díaz Fernández (Spain)
José L. García Figueiredo (Portugal)
José Rubén García Menéndez (Spain)
Julián Garrido (Spain)
Amaro Gomes Barreto (Brazil)
Alicia Gomis Berenguer (France)
Roberto Leyva-Ramos (Mexico)
Ana Sofia Mestre (Portugal)
Juan Carlos Moreno Piraján (Colombia)
Paulo Mota (Portugal)
José B. Parra (Spain)
João Pires (Portugal)
Fernando Rey (Spain)
Manuela Ribeiro Carrott (Portugal)
Alirio Rodrigues (Portugal)
Enrique Rodríguez-Castellón (Spain)
Karim Sapag (Argentine)
Joaquín Silvestre-Albero (Spain)
Teresa Valdés-Solís (Spain)
Thijs Vlugt (The Netherlands)
Carlos Wexler (USA)

41RIA-IBA3 LOCAL COMMITTEE

José B. Parra	INCAR-CSIC, Spain
Teresa Valdés-Solís Iglesias	INCAR-CSIC, Spain
Alicia Gomis-Berenguer	CEMHTI-CNRS, France
Eva Díaz Fernández	Univ. de Oviedo, Spain
Ana Casanova Martínez	CEMHTI-CNRS, France
María Cocina Fdez. de Cordoba	CEMHTI-CNRS, France
Vianney Díaz Blancas	Univ. Autónoma San Luis Potosí, Mexico/ CEMHTI-CNRS, France
Vânia Fernandes Lourenço	CEMHTI-CNRS, France
Getaneh Diress Gesesse	CEMHTI-CNRS, France

USEFUL CONTACT DATA

ACCESS

By plane:

Asturias Airport (Santiago del Monte); Tel. (+34) 985127500

To get from the airport to the town:

- *ALSA coach services*: Gijón-Airport-Gijón; https://www.alsa.com/en/web/bus/home
- *Taxi stop at the airport*: 50 € aprox.
- *Motorway (A-8)*: Thirty-minute drive.

By train:

Train Station (RENFE); Sanz Crespo s/n, Gijón; Tel. (+34) 902100818; www.renfe.es

By bus:

Bus Station (ALSA); Magnus Blikstad, 4, Gijón; https://www.alsa.com/en/web/bus/home

LOCAL SERVICES

Gijón Touristic information	http://en.turismo.gijon.es
Local bus	www.busgijon.es
Taxi	http://www.radiotaxigijon.com/web/
	(+34) 985141111 // (+34) 985164444 (Card accepted)

VENUE

Conference. Gijón Convention Center. Av. Dr. Fleming, 481, Gijón

Adsorption School.

Tuesday. Casino de Asturias, Sala Acapulco, Fernández Vallín St., 5, 33205, Gijón

Wednesday-Friday. Gijón Convention Center. Av. Dr. Fleming, 481, Gijón

Iberoamerican Women Scientists Round Table (OPEN ACTIVITY). Antigua Escuela de Comercio, Francisco Tomás y Valiente St., 33201 Gijón

Opening Ceremony and Welcome Cocktail. Casino de Asturias, Sala Acapulco. Fernández Vallín St., 5, 33205, Gijón.

Adsorption at the pub (OPEN ACTIVITIY). Savoy, Covadonga St, 5, 33202 Gijón

Gala Dinner. Bellavista Restaurant, Av. José García Bernardo, 256, 33203, Gijón

#P22

Breakthrough Measurement of Carbon Dioxide Adsorption on Low-cost Activated Carbons Derived from Solid Wastes

Mohsen Karimi [a, b, c, *], **Jose L. Diaz de Tuesta** [a, c], **Carmen Gonçalves** [b], **José A.C. Silva** [b, c], **Alírio E. Rodrigues** [a], **Helder T. Gomes** [a, c]

[a] *Laboratory of Separation and Reaction Engineering (LSRE), Department of Chemical Engineering, Faculty of Engineering, University of Porto, Rua Dr. Roberto Frias, S/N, 4099-002, Porto, Portugal*

[b] *Laboratory of Separation and Reaction Engineering (LSRE), Department of Chemical and Biological Technology, Polytechnic Institute of Braganca, Campus de Santa Apolonia, 5300-857 Braganca, Portugal*

[c] *Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, 5300-253 Bragança, Portugal*

**Corresponding author: Mohsen Karimi, E-mail address: mohsen.karimi@fe.up.pt*

In the recent years, synthesis, preparation and development of valuable carbon materials have received much interest in the view of energy efficiency and sustainability for various applications in CO_2 capture, wastewater treatment and gas storage studies [1, 2]. In the other hand, based on European legislation to management of solid wastes and limiting the utilization of fertilizers from waste as well as finding approaches to manage these materials, novel approaches are required [2]. In this study, compost obtained by mechanical biological treatment plant from municipal solid waste have been considered as a source of activated carbons. Then, by using sulfuric acid (H_2SO_4) and treating at 800 ^{0}C, chemically and thermally activations, respectively, were implemented on the prepared samples. Activated techniques were applied in four procedures. The first one was prepared at 800 ^{0}C, and the second sample was only treated by sulfuric acid, while for third and fourth samples a combination from sulfuric acid and thermal treating have been employed in a reverse procedure. In this way, the samples were first activated at 800 ^{o}C, then treated by sulfuric acid, and in the last one, treating by acid sulfuric has been applied at the first step. Materials have been characterized by thermogravimetric analysis (TGA) that was performed by using a Netzsch STA 409 PC equipment under oxidative atmosphere. For that purpose, the sample was heated in air atmosphere from 323 K to 1273 K at 10 K min^{-1}. The elemental analysis, TGA and textural properties of prepared materials have been reported in Table 1 and Table 2, respectively. Finally, the prepared materials were assessed in the capture of CO_2. The equilibrium data for CO_2 adsorption were collected using breakthrough method in a fixed bed reactor at the post-combustion operational conditions. The isothermic comparison of materials shows the prepared sample by the subsequent treatments with acid sulfuric and thermal calcination has the higher uptake capacity than the other ones and literature reports; which it can derived from several factors. Frist, better textural properties including higher external surface area (S_{ext}), microporous surface area (S_{microp}) and

external surface area (S_{ext}). It can be also ascribed for the desorption of weak superficial groups as consequence of the thermal treatment at 800 ºC.

Table 1: Elemental analysis and remaining residua (ashes) of the materials by thermogravimetric analysis.

Sample	C (%)	H (%)	S (%)	N (%)	Remaining* (%)	Ashes$^{\Psi}$ (%)
C-LPs	21.3	2.3	0.6	1.7	74.2	55.5
C-800-LPs	17.5	0.4	0.4	0.0	81.6	80.6
C-S-LPs	20.1	2.3	0.6	1.7	70.4	34.3
C-S-800-LPs	n.d.					65.9
C-800-S-LPs	18.6	0.5	8.1	0.0	72.7	72.4

* Remaining is the value from the subtraction of C, H, S, N content from 100%.

$^{\Psi}$ Ashes values corresponds with the weight of the samples at the end of the TGA.

n.d. = not determinate.

Table 2. Textural properties of the prepared materials determined from BET and *t*-Plot methods.

Sample	S_{BET} ($m^2 \cdot g^{-1}$)	S_{ext} ($m^2 \cdot g^{-1}$)	S_{mic} ($m^2 \cdot g^{-1}$)	V_{mic} ($mm^3 \cdot g^{-1}$)	V_{mic}/V_{Total} (%)	W_{mic} (nm)
C-LPs	13.8	13.8	0.0	0	0.0	-
C-800-LPs	77.3	52.1	25.2	12	14.0	1.9
C-S-LPs	n.d.					
C-S-800-LPs	279.4	56.1	223.3	92	53.4	1.6
C-800-S-LPs	91.1	59.9	31.2	14	13.6	1.8

n.d. = not determinate.

Acknowledgements

This work is a result of projects VALORCOMP, funded by FEDER through Programme INTERREG V A Spain - Portugal (POCTEP) 2014–2020 and POCI-01-0145-FEDER-006984 – Associate Laboratory LSRE-LCM funded by FEDER through COMPETE2020 - POCI – and by national funds through FCT.

References:

[1]. Yang H, Xu Z H, Fan M H, Gupta R, Slimane R B, Bland A E, Wright I, Journal of Environmental Sciences, 20, 14–27 (2008).

[2]. Wennersten R, Sun Q, Li H, Journal of Cleaner Production, 103, 724-736, (2014).

[3]. Jouhara H, Czajczyńska D, Ghazal H, Krzyżyńska R, Anguilano L, Reynolds A J, Spencer N, Energy. 139, 485-506 (2017).