Waste biorefinery technologies for accelerating sustainable energy processes

Alejandro Rodríguez Pascual
Research Group
BIOPROCESS AND PRODUCTS ENGINEERING
BioPrEn

https://www.uco.es/investiga/grupos/RNM-940_BioPrEn/

https://arpascual2013.wordpress.com/

https://www.uco.es/qieiq/

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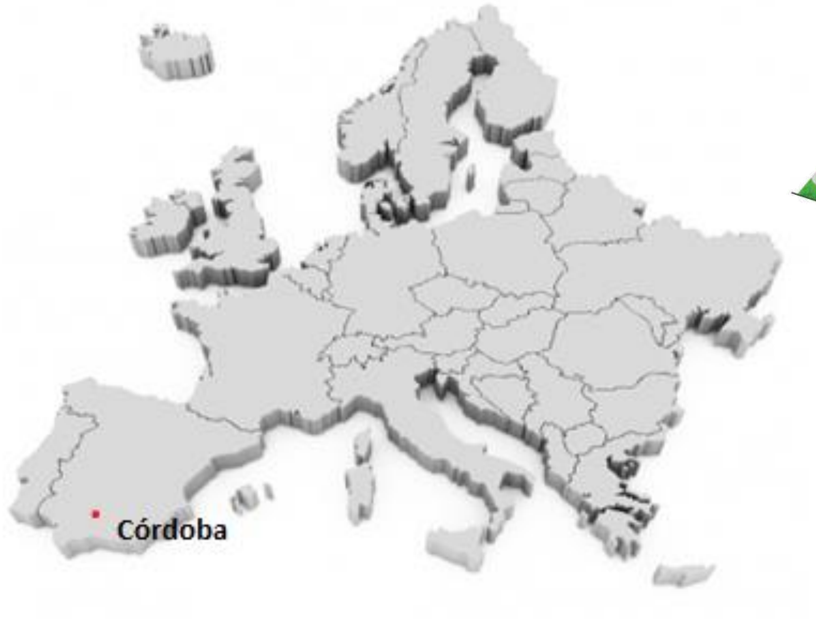
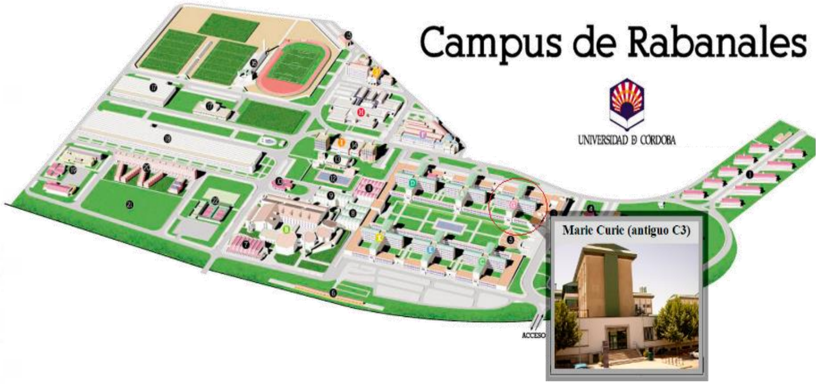
Waste biorefinery technologies for accelerating sustainable energy processes





Chemical Engineering Department
Science Faculty
Universidad de Córdoba
Spain

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Waste biorefinery technologies for accelerating sustainable energy processes

Importance of dissemination and outreach for (small) research groups

Alejandro Rodríguez Pascual

11th May 2022

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BIOPROCESS AND PRODUCTS ENGINEERING

Agrifood residues to obtain cellulosic pulps
from **paper and cardboard** application
(PhD using olive tree prunings 2002)

<2002

Olive tree prunings
Orange tree prunings
Cereal straw
Vine shoots
Fast-growing vegetables
Sugar cane bagasse
Sunflower stalks, etc.








BIOPROCESS AND PRODUCTS ENGINEERING

2007→ Biorefinery of Agrifood residues. Valorization of main fractions: cellulose, hemicellulose and lignin

2007→2016 2 Permanent staff

Full professor and me (under Ramón y Cajal contract)

2016→2020 1 Permanent staff

2020→ 5 Permanent staff

2-3 PhD students / year

AGRI-FOOD INDUSTRY

7,900 MM people in the world and growing

LARGE AMOUNT OF WASTE EACH YEAR

$ $

VALORIZE

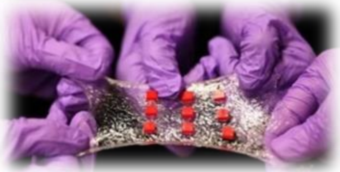
€

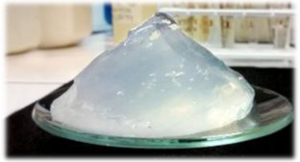
through

ENVIRONMENTALLY FRIENDLY PROCESSES

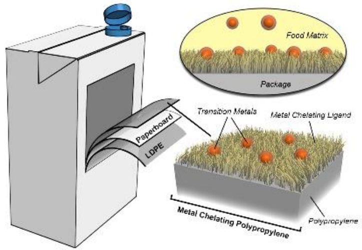
VALORIZE

- Sustainable development
- Added value
- Integral utilization
- Decrease in the quantity of waste
- Improvement of the agro-food industry
- Increase of the competitiveness
- Independece of subsidies






E300
102
E133
E124
E132
E111


Food Matrix
Package
Transition Metals
Metal Chelating Ligand
Paperboard
LDPE
Metal Chelating Polypropylene
Polypropylene

Small research group

Need to make themselves known

Dissemination

HOW?

Scientific Culture and Innovation Unit (UCCi) → Created to improve the training, culture and scientific knowledge of the citizens

Specialized company forums Technological platforms → Meeting point for professionals

Scientific meetings → Important to find complementary lines of research and establish synergies

Scientific Culture and Innovation Unit (UCCi)

HOW?

The European Researchers' Night	Since 2015 until now
Coffee with Science	2014, 2016, 2018, 2020, 2021
Patios of Science	2021, 2022

Scientific Culture and Innovation Unit (UCCi)

HOW?

Appointment with Science	2017
Ingenuity on the road	2018
Bites of Science	2021

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WIRE

Scientific Culture and Innovation Unit (UCCi)

RESULTS

AND-INVESTIGACIÓN TECNOLOGÍA

Investigadores prueban la paja de trigo como componente de baterías de litio

REDACCIÓN
12/12/2017 12:17

Escuchar este artículo ahora
00:00 Suscríbete para escuchar 02:03

Córdoba, 12 dic (EFE).- Un grupo de investigación de la Universidad de Córdoba (UCO) está desarrollando un estudio que prueba que la paja de trigo podría convertirse en un componente más de las baterías de litio.

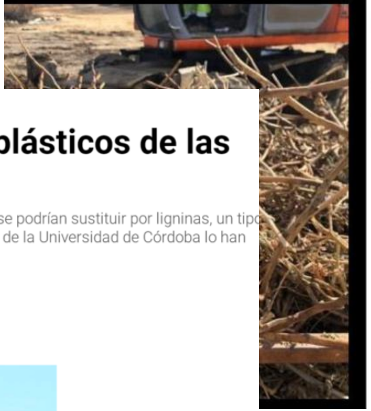
La UCO ha informado en un comunicado de que los estudios del equipo de investigación, coordinado por el profesor del departamento de Química Inorgánica e Ingeniería Química

Innovación y Ciencia

Desarrollan envases con pasta de celulosa a partir de residuos hortofrutícolas

Desarrollan envases con pasta de celulosa a partir de residuos hortofrutícolas

Personal investigador de la Universidad de Córdoba extrae pasta de celulosa a partir de restos berenjena, pimiento y tomate que se puede incorporar en el proceso de fabricación



BIOfreshCloud
70 weeks ago

BIOfreshCloud(BFC) is an European project aimed at volorising agri-food residues to generate innovative and sustainable food packaging systems to improve vegetable shelf-life. BFC started its activities using raspberries pruning to generate suitable trays for berries.

Share this post

QUÍMICA

Paja de trigo para sustituir los plásticos de las baterías de litio

Algunos de los componentes tóxicos que incluyen las baterías de litio se podrían sustituir por ligninas, un tipo de polímero orgánico presente en los tejidos vegetales. Investigadores de la Universidad de Córdoba lo han comprobado al aislar y caracterizar las ligninas de la paja de trigo.

SINC 13/12/2017 08:13 CEST

Desarrollan envases con pasta de celulosa a partir de *residuos hortofrutícolas*

Por REDACCION AENVERDE

Anualmente, los invernaderos retiran una cantidad elevada de residuos hortofrutícolas de tipo leñoso una vez finaliza la temporada de cosecha. Bajo la idea de aprovecharlos, **un equipo de investigación del grupo RNM-940** Bioproducts and Process Engineering (BIOPREN), del Departamento de Química Inorgánica e Ingeniería Química de la Universidad de Córdoba,

HOW?

Specialized company forums
Technological platforms

WIRE

HOW?

Specialized company forums
Technological platforms

Transfiere, European Meeting on Science, Technology and Innovation

2018, 2020 and 2021

The biggest professional and multi-sectoral Forum for knowledge and technology transfer that takes place in Spain, and that gathers the most relevant players in the national and international R&D&i ecosystem

Use of horticultural waste for the manufacture of useful packaging in the food sector (ENVAGRO)

Biorefinery of agri-food by-products. Opportunities for the development of a circular economy. Success stories

Valorization of lignocellulosic residues from agricultural and timber exploitation.

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HOW?

Specialized company forums
Technological platforms

Campus of International Agri-food Excellence

Integration of Universities of Almería, Huelva, Jaen and Cádiz led by the University of Córdoba, which puts all its knowledge in the agri-food sector at the service of society with the aim of contributing to the development of the sector and responding to agri-food challenges of the 21st century

ceiA3 campus de excelencia internacional agroalimentario

Valorization of olive residues

Circular bioeconomy with the olive grove and olive oil industry sector

They find a way to extend the life cycles of products using agricultural residues

Audiovisual pill | Alternative management measures for alperujo

HOW?

Specialized company forums
Technological platforms

MIEMBRO
Bioplat
2022
CERTIFICADO

Smart Agrifood Summit
Málaga
30 sep-1
2021
P EUROPE ECOSYSTEM FOR OPEN INNOVA

SUSCHEM ES
European Technology Platform
For Sustainable Chemistry

fruit attraction

cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

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FACULTAD DE CIENCIAS UNIVERSIDAD DE CÓRDOBA

W I R E

RESULTS?

BIOTRISKEL BIOTECHNOLOGIES

AZCATEC TECNOLOGIA E INGENIERIA

cetec centro tecnológico del calzado y del plástico

aiju Instituto Tecnológico de producto infantil y ocio

celsur

DEMBECO

Granja A HUEVO

ainia centro tecnológico

TECH TRADE INGENIERÍA A LA MEDIDA

REGEMAT 3D

rioma.es textiles

AVIVET VETERINARY SERVICES FOR THE POULTRY WORLD

SP GROUP

daplast

Smurfit Kappa

HOW?

COST ACTIONS

SCIENTIFIC NETWORKS

Scientific meetings

IWBLCM 2015

IWBLCM 2019

HOW?

COST ACTIONS

LIGNOCOST CA17128

Establishment of a Pan-European Network on the Sustainable Valorisation of Lignin

ACTINPACK CA FP1405

Active and intelligent fibre-based packaging innovation and market introduction

AEROGELS CA18125

Advanced Engineering and Research of aeroGels for Environment and Life Sciences

WIRE CA20127

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W I R E

SCIENTIFIC NETWORKS

HOW?

CYTED NETWORKS

PROVALOR

Value Added Products from Agro and Forestry Industrial Waste. (Productos de Valor Agregado a Partir de Residuos Agro y Forestoindustriales)

RIADICYP

Ibero-American Network of Teaching and Research in Pulp and Paper (Red Iberoamericana de Docencia e Investigación en Celulosa y Papel)

NANOCELIA

Technology transfer on nanocellulose applications in Iberoamerica (Transferencia tecnológica sobre aplicaciones de nanocelulosa en Iberoamérica)

HOW?

2013 → 1st International Workshop on Biorefinery of Lignocellulosic Materials

Called first but perhaps the last?

First decision (after title) → 4 days on June

WHY?

OBJECTIVES

- ✓ STRENGTHEN EXISTING RELATIONSHIPS
- ✓ MEET NEW RESEARCHERS
- ✓ TO MAKE MY RESEARCH GROUP KNOWN
- ✓ TO PUT *CÓRDOBA* ON THE INTERNATIONAL SCENE → LIGNOCELLULOSIC BIOMASS
- ✓ ATTRACT YOUNG AND SENIOR RESEARCHERS TO THE CONGRESS

HOW?

How to achieve these Objectives?

- ✓ Attractive scientific program
- ✓ Attractive social program
- ✓ Low prices

IWBLCM 2015
1st International Workshop on Biorefinery of Lignocellulosic Materials
9-12 June 2015, Córdoba, Spain

Funded by the European Union

WIRE

Results

IWBLCM 2015

90 researchers
19 countries

cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

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HOW?

W I R E

IWBLCM 2015

IWBLCM 2015

1st International Workshop on Biorefinery of Lignocellulosic Materials

9-12 June 2015, Córdoba, Spain

5 manuscripts with international collaboration **<2015**

18 manuscripts with international collaboration **2015-**

0 international proposal **<2015**

5 international proposal **2015-**

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HOW?

W I R E

IWBLCM 2019

Fees 250 € (all)

- Submission of up to two abstracts
- Documentation of the Congress
- Coffee breaks
- Lunches
- Cocktail at the Opening Ceremony
- Gala dinner
- Very attractive social program

IWBLCM 2019

Welcome Cocktail
Guide Tour
Nocturnal visit to "La Mezquita-Catedral"
Equestrian show "Pasión y Duende del Caballo Andaluz"
Gala Dinner at "Caballerizas Reales

Inaugural Conference
Dr. Orlando J. Rojas Aalto University, Finland
Plenary lectures
Dra Solange Mussatto Technical University of Denmark, Denmark
Dr Carlos Negro Universidad Complutense de Madrid, Spain
Dr Marc Borrega VTT Technical Research Centre of Finland, Finland
Dr Thomas Rosenau BOKU University, Vienna, Austria
Dr Alfred French, Editor in Chief Cellulose, USA

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HOW?

WIRE

IWBLCM 2019

SI in **Cellulose**

SI in **Holzforschung**

SI in **International Journal of Biological Macromolecules**

IWBLCM 2019

100 researchers
19 countries
(Hungary and Latvia instead of Korea and Indonesia)

CONCLUSIONS

- It is necessary to explain to the population what the research is about
- All outreach activities are important
- No matter how small it may seem, it is necessary to participate, because you never know which people will attend.

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Thank you for your attention!

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