

NEWSLETTER

JUNE 2012



DIBANET



The latest edition of the newsletter provides you with updated results and outcomes of the DIBANET project. The consortium met last time in Santiago de Chile in January 2012 where the current and future project activities and their potential outcomes were discussed. The project will finish at the end of 2012. Several promising results have been achieved in the last years that will be presented on the DIBANET Networking Day in November 2012.

The DIBANET E-learning has been launched and is available free of charge to everyone interested in 2nd generation biofuel production.

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ABOUT DIBANET

DIBANET (www.dibanet.org), the Development of Integrated Biomass Approaches Network, is a 42 month, € 3.73m research project that is funded by the EU's Seventh Framework Program. It is coordinated by the Carbolea Research Group at the University of Limerick (www.carbolea.ul.ie) in Ireland, and builds on the key, complementary, strengths of European and Latin American researchers and industries to advance the development of second generation biofuels. It focuses on the conversion, by non-biological means, of the residues and wastes of Europe and Latin America. DIBANET offers the possibility of converting agricultural residues and wastes into sustainable biofuels and additional value added products. This work will contribute to the development of the green economy and will help to secure jobs into the future.



PROJECT ACTIVITIES

BRAZIL AND UK KNOWLEDGE EXCHANGE: CATALYTIC PYROLYSIS

In November 2011, Professor Tony Bridgwater of Aston University Bioenergy Research Group in the UK will be hosting Professor Victor Teixeira from the Federal University of Rio de Janeiro, Brazil.

The one-month visit will be funded by the UK's Royal Academy of Engineering, as part of its Distinguished Visiting Fellowship Scheme, which encourages the exchange of knowledge and experiences between UK institutions and international eminent experts. Currently Aston University Bioenergy Research



Professor Victor Teixeira of the Federal University of Rio de Janeiro (centre) with members of Aston University Bioenergy Research Group (from left to right: Manisha Patel, Daniel Nowakowski, Ana Cortes, Professor Tony Bridgwater).

Group (BERG) and the Nucleus of Catalysis group at the Federal University of Rio de Janeiro (UFRJ) are working in collaboration on upgrading primary vapours and liquid products from fast pyrolysis of biomass into higher quality products for use as transport fuels and chemicals within the EC sponsored DIBANET project. This involves production of catalysts in UFRJ and testing at Aston University, but does not provide hands-on experience of how catalysts perform in a fast pyrolysis process. BERG has a global reputation in biomass fast pyrolysis but is short of increasingly important catalyst production expertise to meet requirements for biofuels, while UFRJ has an international reputation in developing new catalysts but lacks fast pyrolysis processing units.

MEETING IN CHILE

All twelve partners of the DIBANET consortium were presented at the project meeting in Santiago, Chile 9-11 January 2012. Partners agreed, among others, on the change of focus to the improvement of energy balance by the use of residues in thermal conversion processes. Gasification has been added to the DIBANET activities as well. However, carbon sequestration in order to prevent soil degradation will remain a key aspect to sustainability.

The aim of Professor Teixeira's forthcoming visit to the UK is to allow him to test his catalysts in action. This will improve the understanding of how to design and manufacture improved catalysts for upgrading fast pyrolysis vapours and liquids and better understand how to integrate catalysts into fast pyrolysis. This work aims to overcome the limitations of work conducted to date by using new catalysts and multi-stage processing, and will provide a unique opportunity to test the new catalysts on the primary vapour and liquid products from fast pyrolysis in Aston's laboratory. Consideration will also be given to secondary catalytic upgrading to create a more focussed multistage process analogous to conventional refining.

Brazil already has a well established biofuel industry with substantial production of bioethanol. The recent discovery of oil reserves will refocus its interest onto the much higher energy density hydrocarbon fuels, and the outcomes from this project will be of considerable potential interest to the Brazilian petroleum and petrochemical industry. Similarly, the potential new and improved processes to be identified during Professor Teixeira's visit to Aston University will help to give the UK a leading edge in renewable energy as well as enabling technology transfer to Brazil.

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CATALYTIC UPGRADING OF LEVULINIC ACID TO ETHYL LEVULINATE USING REUSABLE SILICA-INCLUDED WELLS-DAWSON HETEROPOLYACID AS CATALYST

Gustavo Pasquale, Patricia Vazquez, Gustavo Romanelli, Graciela Baronetti

The article on catalytic upgrading of levulinic acid has recently published in *Catalysis Communications* 18 (2012) 115–120.

Abstract:

In this paper we report, for the first time, the direct incorporation of a heteropolyacid (HPA) with Wells-Dawson structure during the synthesis of silica by the sol-gel technique, in acidic media, using tetraethyl orthosilicate. The catalyst characterization was carried out by ³¹P MAS-NMR, FT-IR, XRD, N₂ adsorption-desorption measurements, and the acidic properties were determined through potentiometric titration with n-butylamine. The synthesized catalysts were used in the esterification of levulinic acid with ethanol, at 78 °C, to obtain ethyl levulinate. The synthesis of silica-included HPAs was satisfactory, and the samples kept their HPA structure intact after synthesis. The catalytic tests for the esterification reaction between levulinic acid and ethanol to produce ethyl levulinate have shown that the silica-included Wells-Dawson HPA is an active and selective catalyst for this reaction. It must be noted that silica-included HPAs also kept their structure and catalytic activity after three consecutive reaction cycles. These results indicated that these solid acids are promissory catalysts for the esterification reaction of levulinic acid and ethanol to ethyl levulinate.

LEVULINIC ACID ESTERIFICATION WITH ETHANOL TO ETHYL LEVULINATE PRODUCTION OVER SOLID ACID CATALYSTS

D.R. Fernandes, A.S. Rocha, E.F. Maia, Claudio J.A. Motab, V. Teixeira da Silva

An article has recently published on *Applied Catalysis in* © 2012 Elsevier B.V. *Applied Catalysis A: General* 425–426 (2012) 199–204.

Abstract:

Levulinic acid is considered as a versatile building block because it can be used for the synthesis of several organic chemicals. In particular, its esterification with ethanol produces ethyl levulinate that can be used as diesel miscible biofuel (DMB), preventing global warming by decreasing atmospheric CO₂ generated from the consumption of fossil fuels. This article explores the use of two groups of solid acid catalysts (sulfated oxides and zeolites with different pore structures) in the esterification of levulinic acid with ethanol aiming for ethyl levulinate production. It was found that while there is a correlation between the number of acidic sites and activity for the sulfated oxides, the same is not true for the studied zeolites where the pore channels play a more important role. Among the catalysts tested, Amberlyst-15 and sulfated SnO₂ showed a remarkable high yield of ethyl levulinate that was probably due to the strong acidity provided by SO₃H functional groups and SO₄ species, respectively.

The DIBANET E-learning is opened!

The DIBANET project offers two e-learning courses on diesel production from wastes and residues, free-of-charge. The courses are available after registration to everyone interested in second generation diesel production.

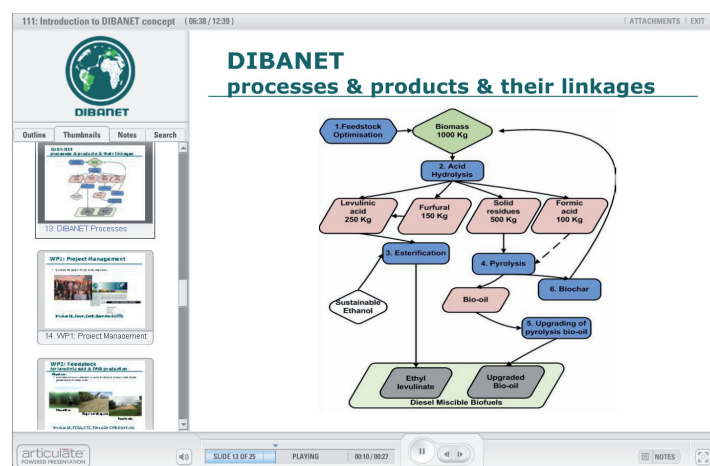
www.dibanet.org/elearning.php

Course 1: HYDROLYSIS OF BIOMASS FOR SECOND GENERATION BIOFUEL PRODUCTION

- The course on hydrolysis consists of a general introduction to the DIBANET and biorefinery concept (module 1);
- the key characteristics of selected feedstock in Europe and Latin America and analytical methods for their analysis (module 2);
- the procedure of acid hydrolysis (module 3) and catalysts used during the procedure (module 4);
- and the assessment of diesel miscible biofuels produced to comply to EU 590 on biodiesel (module 5).

Course 2: THERMAL PROCESSING OF BIOMASS FOR SECOND GENERATION BIOFUEL PRODUCTION

- The course on thermal processing consists of a general introduction to the DIBANET and biorefinery concept (module 1);
- descriptions of pyrolysis and gasification procedures (module 2-3)
- and upgrading of their products (module 4)
- as well as the assessment of diesel miscible biofuels produced to comply to EU 590 on biodiesel (module 5).



Coming soon....

DIBANET NETWORKING DAY IN 2012

Check our website at www.dibanet.org

CONTENT OF THE COURSES:

COURSE 1: HYDROLYSIS

Introduction to DIBANET

- Chapter 1: Introduction to DIBANET concept
Prof. Michael H. B. Hayes, University of Limerick, Ireland
- Chapter 2: Introduction to biorefinery concept
Prof. Michael H. B. Hayes, University of Limerick, Ireland
- Chapter 3: Importance of biomass in the energy matrix
Mr. Sergio Fabian Sein, YPF, Argentina

Feedstocks for diesel miscible biofuel and platform chemical production

- Chapter 1: Carbohydrate chemistry: important components for acid hydrolysis
Prof. Michael H. B. Hayes, University of Limerick, Ireland
- Chapter 2: Feedstocks of Latin America
Prof. Marcia Miguel Castro Ferreira and Magale Rambo, University of Campinas, Brazil
- Chapter 3: European biorefining feedstocks
Dr. Daniel Hayes, University of Limerick, Ireland
- Chapter 4: Conventional analytical methods for biomass analysis
Dr. Daniel Hayes, University of Limerick, Ireland
- Chapter 5: Rapid analytical methods for biomass analysis: NIR
Dr. Daniel Hayes, University of Limerick, Ireland
- Chapter 6: Rapid analytical methods for biomass analysis: NIR II.
Dr. Daniel Hayes, University of Limerick, Ireland

Acid hydrolysis of biomass

- Chapter 1: Introduction to acid hydrolysis
Dr. Buana Girisuta, University of Limerick, Ireland
- Chapter 2: Pre-treatment of biomass for acid hydrolysis
Karla Dussan, University of Limerick, Ireland
- Chapter 3: Kinetics of Acid hydrolysis and derivatives
Dr. Buana Girisuta, University of Limerick, Ireland
- Chapter 4: Products of acid hydrolysis
Dr. Buana Girisuta, University of Limerick, Ireland

Catalysis in Acid hydrolysis

- Chapter 1: Catalysis in acid hydrolysis of biomass
Dr. Angela Rocha, Federal University of Rio de Janeiro, Brazil
- Chapter 2: Heteropolyacids as solid catalysts: Properties, synthesis and characterization
Prof. Graciela Baronetti, University of Buenos Aires, Argentina
- Chapter 3: Catalysis in Thermal Conversion Processes
Dr. Eleni F. Iliopoulou, CERTH, Greece

Assessment of diesel miscible biofuels produced

- Chapter 1: Analysis of DMBs produced
Mr. Sergio Fabian Sein, YPF, Argentina

COURSE 2: THERMAL PROCESSING

Introduction to DIBANET

- Chapter 1: Introduction to DIBANET concept
Prof. Michael H. B. Hayes, University of Limerick, Ireland
- Chapter 2: Introduction to biorefinery concept
Prof. Michael H. B. Hayes, University of Limerick, Ireland
- Chapter 3: Importance of biomass in the energy matrix
Mr. Sergio Fabian Sein, YPF, Argentina

Pyrolysis

- Chapter 1: Biofuels
Prof. Tony V. Bridgwater, Aston University, the United Kingdom
- Chapter 2: Biomass Slow Pyrolysis
Prof. Tony V. Bridgwater, Aston University, the United Kingdom
- Chapter 3: Thermal biomass conversion by gasification technology
Prof. Tony V. Bridgwater, Aston University, the United Kingdom

Fast pyrolysis

- Chapter 1: Biomass pyrolysis
Prof. Tony V. Bridgwater, Aston University, the United Kingdom
- Chapter 2: Biomass Fast Pyrolysis Opportunities
Prof. Tony V. Bridgwater, Aston University, the United Kingdom
- Chapter 3: Biomass Catalytic Pyrolysis
Dr. Eleni F. Iliopoulou, CERTH, Greece

Upgrading of pyrolysis products

- Chapter 1: Upgrading biomass fast pyrolysis liquids
Prof. Tony V. Bridgwater, Aston University, the United Kingdom
- Chapter 2: Upgrading of acid hydrolysis products: esterification
Dr. Angela Rocha, Federal University of Rio de Janeiro, Brazil
- Chapter 3: Upgrading by catalytic cracking
Dr. Angelos A. Lappas, CERTH, Greece

Assessment of diesel miscible biofuels produced

- Chapter 1: Analysis of DMBs produced
Mr. Sergio Fabian Sein, YPF, Argentina

Description on how to use the e-learning is available on the following [link](#).

RELEVANT ENERGY EVENTS IN JUNE – DECEMBER 2012

Renewable Energy World Europe

12-14 June 2012, Cologne, Germany

[Event website](#)

European Biodiesel Summit

13-14 June 2012, Krakow, Poland

[Event website](#)

20th European Biomass Conference and Exhibition

18-22 June 2012, Milano, Italy

[Event website](#)

The Energy and Materials Research Conference EMR2012

20-22 June 2012, Torremolinos, Malaga, Spain

[Event website](#)

3rd AEBIOM European Bioenergy Conference

25-27 June 2012, Brussels, Belgium

[Event website](#)

ISCRE 22 — 22nd International Symposium on Chemical Reaction Engineering

2-5 September 2012, Maastricht, The Netherlands

[Event website](#)

WasteEng 2012 - 4th International Conference on Engineering for Waste and Biomass Valorisation

10-13 September 2012, Porto, Portugal

[Event website](#)

Science for Biomass Feedstock Production and Utilization

2-5 October 2012, New Orleans, USA

[Event website](#)

ebec: European Bioenergy Expo and Conference

10-11 October 2012, Stoneleigh Park, Warwickshire, UK

[Event website](#)

European Future Energy Forum 2011

10-12 October 2012, Geneva, Switzerland

[Event website](#)

4th Nordic Wood Biorefinery Conference

23-25 October 2012, Helsinki, Finland

[Event website](#)

UBIOCHEM-III: Sustainable production of fuels/energy, materials & chemicals from biomass, the third Interna- tional Workshop of COST Action

1-3 November 2012, Thessaloniki, Greece

[Event website](#)

Venice 2012 - 4th International Symposium on Energy from Biomass and Waste

12-15 November 2012, Venice, Italy

[Event website](#)

Biofuels for Sustainable Development of Southern Europe (Bio4SuD)

19-20 November 2012, Thessaloniki, Greece

[Event website](#)

Renexpo South-East Europe

21-23 November 2012, Bucharest, Romania

[Event website](#)

International Biorefining Conference and Trade Show

27-29 November 2012, Houston, Texas, USA

[Event website](#)

RELEVANT FP7 PROJECT

BRISK is a new research infrastructure.

ITS MAIN ACTIVITY is to fund researchers from any EU country to carry out thermochemical biomass conversion research at any of the 26 partners' facilities. The project will pay for the costs associated with accessing and supporting the facilities, along with a grant to contribute to travel, accommodation and subsistence.

BRISK – Biofuels Research Infrastructure for Sharing Knowledge – is funded by the European Commission Seventh Framework Programme (Capacities).

The **facilities** available are listed [here](#)

Details on **how to apply for funding** are provided [here](#)