

*Program*

# ***Biochar: Production, Characterization and Applications***

August 20-25, 2017  
Hotel Calissano  
Alba, Italy

**Conference Co-Chairs:**

**Franco Berruti**

Western University, London, Canada

**Ondrej Masek**

University of Edinburgh, Edinburgh, UK

**Raffaella Ocone**

Heriot-Watt University, Edinburgh, UK



**Engineering Conferences International**  
32 Broadway, Suite 314 - New York, NY 10004, USA  
Phone: 1 - 212 - 514 - 6760, Fax: 1 - 212 - 514 - 6030  
[www.engconfintl.org](http://www.engconfintl.org) – [info@engconfintl.org](mailto:info@engconfintl.org)

**Hotel Calissano**  
**Via Pola 8**  
**12051, Alba (Cuneo)**  
**Italy**  
**Tel: +39-0173-364855**

Engineering Conferences International (ECI) is a not-for-profit global engineering conferences program, originally established in 1962, that provides opportunities for the exploration of problems and issues of concern to engineers and scientists from many disciplines.

#### ECI BOARD MEMBERS

Barry C. Buckland, President  
Mike Betenbaugh  
Nick Clesceri  
Peter Gray  
Michael King  
Raymond McCabe  
David Robinson  
Eugene Schaefer  
P. Somasundaran

Chair of ECI Conferences Committee: Nick Clesceri

ECI Technical Liaison for this conference: Franco Berruti

ECI Executive Director: Barbara K. Hickernell

ECI Associate Director: Kevin M. Korpics

## **Organizing Committee and/or Session Chairs**

### USA and Canada

Ajay Dalai (University of Saskatchewan)

Don Harfield (Alberta Innovates)

Tom Miles (US Biochar Initiative and International Biochar Initiative)

Maren Oelbermann (University of Waterloo)

Shahab Sokhansanj (University of British Columbia)

### Europe

Silvia Baronti (CNR, Firenze, Italy)

David Chiaramonti (Universita' di Firenze, Italy)

Capucine Dupont (CEA, France)

Daniele Fabbri (Universita' di Bologna, Italy)

Silvia Fiore (Politecnico di Torino, Italy)

Lorenzo Genesio (CNR, Firenze, Italy)

Mauro Giorcelli (Politecnico di Torino, Italy)

Bruno Glaser (Martin Luther University, Germany)

Carlo Grignani (Universita' degli Studi di Torino, Italy)

Roger Kilburn (iBiolC, UK)

Joan Manyà (University of Zaragoza, Spain)

Franco Miglietta (CNR, Firenze, Italy)

Andrea Rizzo (Universita' di Firenze, Italy)

Saran Sohi (University of Edinburgh, UK)

Alberto Tagliaferro (Politecnico di Torino, Italy)

Magda Titirici (Queen Mary University of London, UK)

Francesco Vaccari (CNR, Firenze, Italy)

Conference Sponsors



ISTITUTO ITALIANO  
DI TECNOLOGIA



OCONE

1910



**Endorsed by**



## **Sunday, August 20, 2017**

16:00 – 18:00	Registration
17:00 – 18:00	Organizing Committee Meeting
18:00 – 19:30	Welcome Reception
20:00 – 21:30	Dinner

### **NOTES**

- *Technical and poster sessions will be in Luigi Calissano.*
- *All speakers should also bring a poster presentation of their talk that will be displayed the same day as the talk.*
- *Audiotaping, videotaping and photography of presentations are all prohibited.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).*
- *Speakers – Please leave at least 3 minutes for questions. Extended discussion will take place at the poster session*
- *Please do not smoke at any conference functions.*
- *Turn your cellular telephones to vibrate or off during technical sessions.*

**Monday, August 21, 2017**

- 07:30 – 08:30 Breakfast
- 08:30 – 08:45 Welcome and Conference Overview
- 08:45 – 09:20 **PLENARY**  
**Biochar: From ligno-cellulosic materials to engineered products for environmental services**  
Manuel Garcia-Perez, Washington State University, USA
- 09:20 – 09:40 **Thermocatalytic-Reforming (TCR®) and TCR®-biochar properties**  
Markus Heberlein, Fraunhofer Institute for Environmental, Safety, and Energy Technology UMSICHT, Germany
- 09:40 – 10:00 **Autothermal biochar production and characterization at pilot scale**  
Andrea M. Rizzo, RE-CORD, Italy
- 10:00 – 10:20 **Woody and agricultural biomass diversity in torrefaction: A complete study in solid conversion and volatiles formation on TGA-GCMS**  
María González Martínez, CEA Grenoble, LGC - INP Toulouse, France
- 10:20 – 10:50 Coffee Break
- 10:50 – 11:10 **Production and characterization of slow pyrolysis biochar from lignin-rich digested stillage from 2<sup>nd</sup> generation bioethanol production**  
Frederik Ronse, Ghent University, Belgium
- 11:10 – 11:30 **A three-stage thermochemical conversion process for the production of biochar**  
Alessandro Scova, Sea Marconi Technologies, Italy
- 11:30 – 11:50 **Biochar from microwave pyrolysis of selected feedstocks**  
Muhammad Afzal, University of New Brunswick, Canada
- 11:50 – 12:10 **Biochar production through slow pyrolysis of different biomass materials: Seeking the best operating conditions**  
Joan J. Manyà, University of Zaragoza, Spain
- 12:10 – 12:30 **Investigation of innovative and conventional pyrolysis of ligneous and herbaceous biomasses for biochar production**  
Silvia Fiore, Politecnico di Torino, Italy
- 12:30 – 12:50 **Pyrolysis of residues from well-established biochemical processes for the production of biochar**  
Devon Barry, ICFAR, The University of Western Ontario, Canada
- 12:50 – 13:10 **Biochar production through hydrothermal carbonization: Energy efficiency and cost analysis of an industrial-scale plant**  
Fabio Merzari, Università di Trento, Italy
- 13:10 – 14:10 Lunch
- 14:10 – 17:00 Networking/*ad hoc* sessions
- 17:00 – 17:20 Afternoon Refreshments



**Monday, August 21, 2017 (continued)**

- 17:20 – 17:40            **Production of activated carbon from barley biochar precursor**  
Javier Pallares Ranz, University of Zaragoza\CIRCE Research Institute, Spain
- 17:40 – 18:00            **Activation and mild oxidation of vacuum pyrolysis biochar**  
Serge Kaliaguine, Université Laval, Canada
- 18:00 – 18:20            **Modeling of radical structures in biochar using DFT calculations**  
Anna Trubetskaya, Umeå University, Sweden
- 18:20 – 18:40            **BiocharFX: Production with carbonFX technology, characterization and applications in potting soil related to plant production**  
Sébastien Lange, Biopterre, Canada
- 18:40 – 19:00            **Biochar production and application in the Intermountain West**  
Darren McAvoy, Utah State University, USA
- 19:00 – 19:20            **Biochar: Product development in remote regions from mixed residues**  
Kelly Hawboldt - Memorial University, Canada and Stephanie MacQuarrie - Cape Breton University, Canada
- 19:30 – 21:00            Dinner
- 21:00 – 22:30            Poster Session with Social Hour

**Tuesday, August 22, 2017**

- 07:30 – 08:30 Breakfast
- 08:30 – 09:05 **PLENARY**  
**Biochar characterization: Standard biochar and the Charchive**  
Ondrej Masek, University of Edinburgh, United Kingdom
- 09:05 – 09:25 **How to produce a potential high value bio-char from the worst invasive plant in Canada**  
Chiara Barbiero, ICFAR, The University of Western Ontario, Canada
- 09:25 – 09:45 **Characterization of biochar pore structure with X-ray tomography**  
Jari Hyväluoma, Natural Resources Institute Finland (Luke), Finland
- 09:45 – 10:05 **Novel bio-char characterization strategies and their use to study the chemical and morphological evolution of material derived from xylan, cellulose and lignin**  
Manuel Garcia-Perez, Washington State University, USA
- 10:05 – 10:25 **Production of biochar and development of predictive methods for determining performance in value-added composite materials**  
Douglas Matthew Cuthbertson, ICFAR, Western University, Canada
- 10:25 – 10:55 Coffee Break
- 10:55 – 11:15 **Off-gassing of charred pellets during storage**  
Sudhagar Mani, University of Georgia, USA
- 11:15 – 11:35 **Changes in carbon structure distribution and nanostructure of functionalized biochars**  
Elsa Weiss-Hortala, Rapsodee UMR CNRS, France
- 11:35 – 11:55 **Biochar from gasification in cultivated soils and riparian buffer zones: Chemical characterization**  
Ivano Vassura, University of Bologna, Italy
- 11:55 – 12:15 **Biochar characterization and EU27 law harmonization: REFERTIL results**  
Massimo Pugliese, University of Torino, Italy
- 12:15 – 12:35 **Hydrothermal carbonization of sewage sludge: Char characterization and reference to international legislations**  
Fabio Merzari, University of Trento, Italy
- 12:35 – 12:55 **Hydrous pyrolysis of digestate as alternative to post composting in a biowaste anaerobic digestion facility**  
Maria Laura Mastellone, Università della Campania Luigi Vanvitelli, Italy
- 13:00 – 14:00 Lunch
- 14:00 – 17:00 Networking / *ad hoc* sessions
- 17:00 – 17:20 Afternoon Refreshments
- 17:20 – 17:40 **Mobile organic compounds in biochar. Relationships with carbonization degree and bio-oil composition**  
Daniele Fabbri, University of Bologna, Italy

**Tuesday, August 22, 2017 (continued)**

- 17:40 – 18:00      **Lab-scale pyrolysis and hydrothermal carbonization of biomass digestate: Characterization of solid products**  
David Chiaramonti, RE-CORD/CREAR, University of Florence, Italy
- 18:00 – 18:20      **Physical properties of charred pellets after two months of storage**  
Sudhagar Mani, University of Georgia, USA
- 18:20 – 18:40      **Analysis of product distribution and characteristics of bio-oil and bio-char from fast pyrolysis of date palm tree waste**  
Yassir Makkawi, Department of Chemical Engineering, American University of Sharjah, United Arab Emirates
- 18:40 – 19:00      **Pyrolysis of cotton stalks and utilization of pyrolysis char for sustainable soil enhancement and carbon storage**  
Sebastian Schaffer, University of Natural Resources and Life Sciences, Vienna, Austria
- 19:00 – 19:20      **Multi-technique characterization of biochar formation**  
Anthony Dufour, CNRS Nancy, France
- 19:20 – 19:40      **Biochar quality management**  
Fabian Stenzel, Fraunhofer UMSICHT, Institute Branch Sulzbach-Rosenberg, Germany
- 20:00 – 21:15      Dinner
- 21:15 – 22:30      Poster Session with Social Hour

**Wednesday, August 23, 2017**

- 07:30 – 08:30 Breakfast
- 08:30 – 09:05 **PLENARY**  
**Which policy for biochar deployment in Southern EU? An integrated approach is possible**  
David Chiaramonti, RE-CORD/CREAR, University of Florence, Italy
- 09:05 – 09:25 **Biochar for remediating contaminated soils: Outdoor experiments in Wales, UK**  
F. Alayne Street-Perrott, Swansea University, United Kingdom
- 09:25 – 09:45 **Monolithic biochar as electrode in supercapacitor**  
Charles Q. Jia, University of Toronto, Canada
- 09:45 – 10:05 **Biochar for pollutant removal from aqueous solutions**  
Raffaella Ocone, Heriot-Watt University, United Kingdom
- 10:05 – 10:25 **Biochar and ash amendment effects on mine reclamation in the boreal forest**  
Jillian M.H. Bieser, University of Toronto, Canada
- 10:25 – 10:55 Coffee Break
- 10:55 – 11:15 **Agronomic benefits and detriments of using biochar**  
Carlo Grignani, University of Turin, Italy
- 11:15 – 11:35 **Evaluating the potential of biochar for reducing bioavailable heavy metal fractions in polluted soil**  
Rosa Soria Penafiel, University of Sheffield, United Kingdom
- 11:35 – 11:55 **Carbon sequestration using bio-refinery residues**  
Ondrej Masek, University of Edinburgh, United Kingdom
- 11:55 – 12:15 **Biochar addition in the anaerobic digestion of the organic fraction of municipal solid waste for biogas production**  
Paola Giudicianni, CNR-IRC, Italy
- 12:15 – 12:35 **Evaluation of the environmental benefits of biochar addition into concrete-based composites**  
Mauro Giorcelli, Politecnico di Torino, Italy
- 12:35 – 12:55 **The role of bio-char as an agro-environmental tool: Formation mechanism and potential for control water release, bacterial retention and greenhouse gas emissions**  
Manuel Garcia-Perez, Washington State University, USA
- 13:00 – 14:00 Lunch
- 14:00 – 17:00 Networking/*ad hoc* sessions
- 17:00 – 17:20 Afternoon Refreshments
- 17:20 – 17:40 **Developing biosensors as monitoring tools to assess the performance of biochar amended contaminated soil**  
Bastian Saputra, University of Sheffield, United Kingdom

**Wednesday, August 23, 2017 (continued)**

- 17:40 – 18:00      **Bio char as cheap and environmental friendly filler able to improve polymer mechanical properties**  
Alberto Tagliaferro, Politecnico di Torino, Italy
- 18:00 – 18:20      **A novel solution for utilizing liquid fractions from slow pyrolysis and hydrothermal carbonization - Acidification of animal slurry**  
Kimmo Rasa, Natural Resources Institute Finland, Finland
- 18:20 – 18:40      **Biochar-ammonium phosphate as an uncoated-slow release fertilizer in sandy soil**  
Haytham Elsharkawi, CLAC - Agricultural Research Center (ARC), Egypt
- 18:40 – 19:00      **Microwave characterization and shielding properties of biochar based polymers and cements**  
Patrizia Savi, Politecnico di Torino, Italy
- 19:00 – 20:15      **International Biochar Initiative (IBI) Webinar: Past, present and future of IBI and the biochar industry**  
Tom Miles, T.R. Miles Technical Consultants, USA and Kathleen Draper, Ithaca Institute for Carbon Intelligence, USA
- 20:15 – 21:30      Dinner
- 21:30 – 22:45      Poster Session with Social Hour

**Thursday, August 24, 2017**

- 07:30 – 08:30 Breakfast
- 08:30 – 08:50 **The effects of biochar as a soil amendment on soil quality and plant growth**  
Ok-Youn Yu, Appalachian State University, USA
- 08:50 – 09:10 **Adsorption of Ammonium (NH<sub>4</sub><sup>+</sup>) Ions onto various Vietnamese biomass residue-derived biochars (wood, rice husk and bamboo)**  
Hien Nguyen, University of Birmingham, United Kingdom
- 09:10 – 09:30 **Effect of biochar addition on carbon dioxide and nitrous oxide emissions from a temperate agricultural soil**  
Maren Oelbermann, University of Waterloo, Canada
- 09:30 – 09:50 **Arsenic removal from drinking water by means of low cost biochars derived from miscanthus and coconut shell**  
Silvia Fiore, Politecnico di Torino, Italy
- 09:50 – 10:10 **Characteristic studies on the waste biomass-based biochars produced by fast pyrolysis**  
Ajay K. Dalai, University of Saskatchewan, Canada
- 10:10 – 10:30 **The influence of biochar on soil characteristics in a temperate agroecosystem**  
Maren Oelbermann, University of Waterloo, Canada
- 10:30 – 11:00 Coffee Break
- 11:00 – 11:20 **Can biochar link forest restoration with commercial agriculture?**  
Kristin Trippe - Oregon State University, USA
- 11:20 – 11:40 **Thermal evolution of biochar and its physicochemical properties during hydrothermal gasification**  
Ajay Dalai, University of Saskatchewan, Canada
- 11:40 – 12:00 **Pyrolytic temperature evaluation of macauba biochar for uranium adsorption from aqueous solutions**  
Ondrej Masek - University of Edinburgh, United Kingdom
- 12:00 – 13:00 Lunch
- 13:00 – 18:30 Excursion by bus: Visit to the Castle of Grinzane Cavour and museum (<http://www.castellogrinzane.com/en/homepage>); the town of Barolo with the Castle and the wine museum (<http://www.cellartours.com/italy/italian-cities/barolo.html>); the Castle of Guarene (<http://www.castellodiguarene.com/>) site of the conference banquet.
- 20:00 – 22:30 Banquet at the Castle of Guarene

**Friday, August 25, 2017**

- 07:30 – 08:30 Breakfast
- 08:30 – 09:05 **PLENARY**  
**Overview of biochar for electrochemistry applications**  
Capucine Dupont, CEA – Grenoble, France
- 09:05 – 09:25 **Evaluation of the long-term effects of pre-conditioned biochar on soil organic carbon in temperate soils using the Century Soil Organic Matter model**  
Maren Oelbermann, University of Waterloo, Canada
- 09:25 – 09:45 **Developing a method of accounting for the material use of biomass/biochar and its positive side benefits within the company carbon footprint: A case study at Hochschule Geisenheim University**  
Georg Ardissonne, Hochschule Geisenheim University, Germany
- 09:45 – 10:05 **Biochar economics and the competition for feedstock**  
Jude Huggan, IBiolC, United Kingdom
- 10:05 – 10:25 **Life cycle assessment of biochar production from southern pine**  
Sudhagar Mani, University of Georgia, USA
- 10:25 – 10:45 **Behavioral factors affecting the adoption of biochar of farmers in Canada**  
Maren Oelbermann, University of Waterloo, Canada
- 10:45 – 11:05 **NewCarbon innovation for sustainable agriculture, soil remediation and water / effluent purification**  
Kristin Trippe - Oregon State University, USA
- 11:05 – 11:25 **Biochars from various biomass types as anodes for sodium-ion batteries**  
Capucine Dupont, CEA, France
- 11:25 – 12:30 Coffee Break and Poster Session for Thursday and Friday
- 12:30 Lunch and Departure

## Poster Presentations

- 1. Biofuel production via dry and wet torrefaction of agro-industrial waste: A comparative study**  
Fabio Merzari, University of Trento, Italy
- 2. Three-dimensional rendering of biochar surfaces from their FESEM images**  
Mauro Giorcelli, Politecnico di torino, DISAT, Italy
- 3. Production, characterization and application of activated biochar from wood residues**  
Flavia Lega Braghiroli, Technology Center for Industrial Waste (CTRI); Research Forest Institute (RFI), University of Québec in Abitibi-Témiscamingue (UQAT), Canada
- 4. Analysis of total organic carbon in soil-biochar systems**  
Daniele Fabbri, University of Bologna, Italy
- 5. Microwave characterization and shielding properties of biochar based polymers and cements**  
Mauro Giorcelli, Politecnico di Torino, Italy
- 6. Adsorption isotherm determination and heavy metal removal by acid-washed softwood biochar**  
Raisa Tjarinto, The University of Sheffield, United Kingdom
- 7. Biochar for gas sensors devices**  
Mauro Giorcelli, Politecnico di Torino, Italy
- 8. Modifying effect of biochar by mixing it with digestate**  
Helena Dvořáčková, Mendel University in Brno, Czech Republic
- 9. Effect of sulfuric acid pre-treatment on the pyrolysis of sewage sludge**  
Nadia Ruiz-Gomez, University of Zaragoza, Spain
- 10. Preparation of biochar and activated carbon from cocoa pod husk by using microwave as ammonium carrier in urea-based fertilizer**  
Fisal Ahmad, Malaysian Cocoa Board, Malaysia
- 11. The use of a sustainable biochar compost for stabilizing and revegetating metal-mine tailings heaps**  
Alayne Street-Perrott, Swansea University, United Kingdom
- 12. Characterization of biochar from Peko Pe gasifier cookstoves**  
Henrik Kofoed Nielsen, University of Agder, Norway
- 13. Biochar: Soil amendment for the future of tree survival?**  
Emma Amber Schaffert, University of Reading, Bartlett Tree Expert Co Ltd, United Kingdom
- 14. Solar assisted pyrolysis for biochar production**  
Paola Giudicianni, Istituto di Ricerche sulla Combustione – CNR, Italy
- 15. Perspectives in the use of biochars as low-cost CO<sub>2</sub> adsorbents**  
Paola Giudicianni, Istituto di Ricerche sulla Combustione – CNR, Italy
- 16. Biochar fracture resistance**  
Anthony Dufour, CNRS Nancy, France