

University Academic Curriculum Vitae

Personal details

Name: Maurizio Grigiante
Place and date of birth: Asiago, 23/03/1965
Nationality: Italian
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Current position

- Job title: Associate Professor
- Starting date: 01/07/2016
- Employer: University (University of Trento)

Teaching qualifications

- Year and title of first degree; 1995: Master degree in Chemical Engineering, University of Padova (Italy)
- Year, subject area and topic of PhD; 2001 Thermodynamics (University of Padova): analysis of properties of refrigerant fluid and study of their performances on innovative refrigerant cycles. Investigations on both experimental and modeling activities. Applications involved on existing plants and tests aiming at evaluating the performances of innovative fluids and their mixtures.
- Year, subject area and topic of habilitation; 2013 Fisica Tecnica Ing-Ind 10, University of Trento.
- Brief description of scientific responsibilities that might benefit the teaching activity: teaching similar issues as those of the requested course Responsibilities in research activities involving topics considered relevant for the teaching issues. Integration of different disciplines having potential interest with the teaching activities and course as thermodynamics and renewable energy.

Teaching experience relevant to the position

Courses taught during the last 5 years

- Title of courses: Fisica tecnica, Energie Rinnovabili, Thermodynamics, District Heating Systems Design
- Name of university/institute: University of Trento

Subject area:

Fisica tecnica: fundamentals of heat and mass transfer of close and open systems; thermodynamics principles, limits and applications. Energetic analysis of systems involved on industrial applications. Modeling of the energy systems and design of basic industrial appliances.

Language: Italian; Academic level: post-graduate; Teaching hours: 60

Energie Rinnovabili: analysis of the most diffused renewable energy systems as solar energy, photovoltaics, biomasses and geothermal energy. Analysis of the models involved to calculate the available natural resources and modeling activities dedicated to the determination of the main parameters of the corresponding renewable energy plants: energy production efficiency of the plants and economic evaluation of the global energy exploitation strategies.

Language: Italian; Academic level: post-graduate; Teaching hours: 60

Thermodynamics: advanced thermodynamics for industrial Engineers specifically dedicated to applications involved on innovative industrial plants (power plants, refrigerant plants, appliances etc.). Equations of states and thermodynamic models and correlations to determine the main thermodynamic properties of fluids and their mixtures. Applications on problems involved on heat and mass transfer: numerical methods integrated with solutions methods. Conditioned air system design and their applications on widely diffused appliances.

Language: English; Academic level: post-graduate and PhD; Teaching hours: 60.

District Heating Systems Design (DHSD): analysis of the advantages involved on the modern approach of heating systems integrated on district strategies. The role of renewable energies when integrated in traditional district energy systems. Analysis of real cases of traditional and integrated district heating systems regarding the energy uses not only on residential

contest but also for industrial district energy applications. Analysis of the most advanced procedures for the district heating and cooling design.

Language: English; Academic level: post-graduate; Teaching hours: 60.

**Professional
experience related
to the teaching
position**

Chronological list of all previous employments

(Please report any details that will enable the commission to evaluate how the professional experience of the candidate will benefit the teaching activity successfully)

- Job Title: Engineer
- Data: from 01/10/1997 to 10/10/1999
Project Engineer at HIROSS Int. Company.
- Level: Supervisor

This employment has allowed to the employer the opportunity to work as engineer on a big company specifically applied on refrigeration processes involved on several industrial productions including food processing technologies and air systems conditioning. The employer had the opportunity to have a significant experience both on design, on testing and monitoring the behavior of several innovative technologies involved on the cited technologies. He gained a good experience in particular in evaluating the effects of several thermal treatments (most regarding refrigeration) when applied in conditioning the state of materials like food, chemical products and substances widely used in industrial applications. The employer considers this experience as a particular skill having benefits for the teaching activities he is applying for.

- Job Title: Researcher
- Data: from 01/06/2012 to 01/06/2014
project coordinator of "CAREs" project at the University of Trento
- Level: Researcher coordinator

This experience jointly with the activities of research carried out at the University of Trento has given to the employer the opportunity to investigate in details the effects of thermal processes carried out at high temperature conditions.

Even if this research activity was specifically dedicated to biomass process exploitation, the investigation was particularly attractive considering that several topics of the research issues have been deeply carried out during the indicated period: the efficiency of the process design and plants, the kinetics and thermodynamics of thermal treatments at different conditions and the impact of these treatments on the environmental air conditions (indoor and outdoor) and pollutions. As coordinator of the project, the employer has the opportunity to gain experience in the management of a complex project involving not only the University but also private companies by involving a significant number of collaborators.

- Experiences

The employer, during his research employment at the University of Trento has the opportunity to spend several periods of studies abroad as researcher at outstanding Institutions as the University of Oldenburg (Germany) and the Ecole des Mines in Paris. He has dedicated his research in particular in studying the innovative refrigerants fluids and their impact on the main parameters adopted to evaluate the performances of widely appliances and plants. This is a specific background that the employer consider of high impact to benefit the teaching activities of the indicated call.

**Scientific
publications
related to the
teaching position**

- **Publications** over the last 10 years in chronological order within each category following the international standard for bibliographic references with DOI whenever possible
- **International Journals**
 - 1) M. Grigiante, M. Brighenti, D. Antolini. "*A generalized Activation Energy equation for Torrefaction of Hardwood biomasses based on Isoconversional methods*".
Accepted for Publication in: **RENEWABLE ENERGY** 2016.
 - 2) M. Grigiante, D. Antolini. "*Mass yield as guide parameter of the torrefaction process. A experimental study of the solid fuel properties referred to two types of biomasses*". **FUEL** 2015; 5 : 499–509.
 - 3) M. Grigiante, D. Antolini. "*Experimental Results of Mass and Energy Yield Referred to Different Torrefaction Pathways*". **WASTE AND BIOMASS VALORIZATION** 2014; 5: 11-17 (5)v. 2014, DOI: 10.1007/s12649-013-9205-3
 - 4) M. Ischia, R. Dal Maschio, M. Grigiante, M. Baratieri, "Clay-sewage sludge co-pyrolysis. A TG-MS and Py-GC study on potential advantages afforded by the presence of clay in the pyrolysis of wastewater sewage sludge" in **WASTE MANAGEMENT**, v. 31, n. 1 (2011), p. 71-77 DOI: 10.1016/j.wasman.2010.05.027
 - 5) M. Grigiante, F. Mottes, D. Zardi, M. de Franceschi, "Experimental solar radiation measurements and their effectiveness in setting up a real-sky irradiance model" in **RENEWABLE ENERGY**, v. 36, n. 1 (2011), p. 1-8. - URL:
 - 6) M. Baratieri, E. Pieratti, T. Nordgreen, M. Grigiante, "Biomass Gasification with Dolomite as Catalyst in a Small Fluidized Bed Experimental and Modelling Analysis" in **WASTE AND BIOMASS VALORIZATION**, v. 1, n. 3 (2010), p. 283-291. - DOI: 10.1007/s12649-010-9034-6
 - 7) , M. Ischia, M. Baratieri, R. Dal Maschio, M. Ragazzi, "Pyrolysis Analysis and Solid Residue Stabilization of Polymers, Waste Tyres, Spruce Sawdust and Sewage Sludge" in **WASTE AND BIOMASS VALORIZATION**, v. 1, v.1., n. 4 (2010), p. 381-393. - URL: <http://www.springer.com/engineering/journal/12649> . - DOI: 10.1007/s12649-010-9056-0
 - 8) P. Baggio, M. Baratieri, L. Fiori, M. Grigiante, D. Avi, P. Tosi, "Experimental and modeling analysis of a batch gasification/pyrolysis reactor" in **ENERGY CONVERSION AND MANAGEMENT**, v. 2009, v. 50, n. 6 (2009), p. 1426-1435. - DOI: 10.1016/j.enconman.2009.03.004
 - 9) M. Baratieri, P. Baggio, B. Bosio, M. Grigiante, G.A. Longo, , "The use of biomass syngas in IC engines and CCGT plants: A comparative analysis" in **APPLIED THERMAL ENGINEERING**, v. 2009, v. 29, n. 16 (2009), p. 3309-3318.
<http://www.sciencedirect.com/science/journal/13594311>
DOI: 10.1016/j.applthermaleng.2009.05.003
 - 10) M. Grigiante, P. Stringari, G. Scalabrin, E. Ihmels, K. Fischer, J. Gmehling, "(Vapour + liquid + liquid) equilibria and excess molar enthalpies of binary and ternary mixtures of isopropanol, water, and propylene" in **JOURNAL OF CHEMICAL THERMODYNAMICS**, v. 40, n. 4 (2008), p. 537-548
 - 11) M. Baratieri, P. Baggio, L. Fiori, M. Grigiante, "Biomass as an energy source: thermodynamic constraints on the performance of the conversion process" in **BIORESOURCES TECHNOLOGY**, v. 2008, n. 99 (2008), p. 7063-7073. - DOI: 10.1016/j.biortech.2008.01.006
 - 12) G. Scalabrin, P. Marchi, M. Grigiante, "Speed of sound predictive modeling in a

three-parameter corresponding states format: application to pure and mixed haloalkanes" in EXPERIMENTAL THERMAL AND FLUID SCIENCE, v. v. 31, n. i. 3 (2007), p. 261-278. - URL: <http://scienceserver.cilea.it/pdflinks/07002514224208871.pdf>

13) P. Marchi, G. Scalabrin, M. Grigiante, "A multiparameter viscosity equation for 1,1-difluoroethane (R152a) with an optimized functional form" in INTERNATIONAL JOURNAL OF THERMOPHYSICS, v. 27, n. 4 (2006), p. 1061-1082

• **International and National Conferences Proceedings (N° 34)**

M. Brighenti, D. Antolini, M. Grigiante. **Experimental kinetic analysis of three types of biomass under torrefaction conditions and modelling study based on isoconversional methods.** World Sustainable Energy Days Conference 22-26 February 2016, Wels (Austria).

M. Brighenti, M. Grigiante, M. Carlesso, D. Antolini. **A complete kinetic model for biomass torrefaction based on a isoconversional approach.** 6th International Conference on Engineering for Waste and Biomass Valorisation – May 23-26, 2016 - Albi, France. Accepted as Oral Presentation.

M. Brighenti, D. Antolini, M. Grigiante. **One-dimensional reactor model for simulation of the biomass torrefaction process** 6th International Conference on Engineering for Waste and Biomass Valorisation – May 23-26, 2016 - Albi, France.

M. Grigiante, M. Brighenti, D. Antolini. **A comparative experimental study on their impact of standard and torrefied wood pellets on the drive parameters of a stratified batch gasifier.** 5th International Congress on Green Process Engineering (GPE 2016) June 19-24, 2016 Fairmont Tremblant Hotel Mont Tremblant, Quebec, Canada.

D. Antolini, M. Grigiante, M. Brighenti. **Hydrophobicity behaviour and fibers distribution of two different woody biomass torrefied at different conditions.** EUBCE2015 23th European and Biomass Conference Proceedings, 1-4 June 2015 (Vienna) PP 1159-1164. DOI:10.5071. ISBN: 978-88-89407-516.

M. Brighenti, D. Antolini, M. Grigiante. **Torrefaction kinetic model of lignocellulosic materials based on fibers thermal decomposition reactions.** EUBCE2015 23th European and Biomass Conference Proceedings, 1-4 June 2015 (Vienna) PP. 1152-1158. DOI:10.5071. ISBN: 978-88-89407-516.

D.Roveda, T.Kienberger, M.Grigiante, J.Karl, "A Tar Online Measurement System Based on the Absorption Principle." in European Biomass Conference and Exhibition Proceedings, Firenze: ETA-FLORENCE Renewable Energy, 2012. Atti di: EU BC&E 2012, Milano, 18-22 June 2012. - URL: <http://www.etaflorence.it/proceedings>

M.Grigiante, D.Antolini, "Experimental Results o Mass and Energy Yield Referred to Different Torrefaction Pathways" in Book of Abstract, Albi, Toulouse: Ecole Nationale Supérieure des Mines d'Albi-Carmaux, 2012, p. 35-36. - ISBN: 2951159196. Atti di: IWBTE, Albi, 10-11th May 2012. - URL: <http://rapsodee.mines-albi.fr/IWBTE/co/Accueil.html> -

M.Grigiante, D.Antolini, "Experimental Torrefaction Plant Parameters as Results of a Direct Heater Pilot Plant investigation ». in Proceedings 4th International Conference on Engineering, Porto (Portugal): Mines d'Albi Campus Jarlard Route de Teillet Albi 81013 Cedex 09 France, 2012, p. 947-952. - (Vol 3). - ISBN: 9791091526005. Atti di WasteEng12, Porto, 10-13, September 2012. - URL: www.wasteeng2012.org.

G.Valducci Vecchi, L.Brusetti, S.Angeli, M. Grigiante, M.Baratieri, "**Energy Analysis and Bioremediation of Tar Applied to the Biomass Gasification Process**" in European Biomass Conference and Exhibition Proceedings, Firenze: ETA-Florence Renewable Energies, 2011, p. 1841-1850. - ISBN: 9788889407554. Atti di: 9thEUBCE2011, Berlin, 6-10 June 2011. <http://www.conference-biomass.com/19th-European-Biomass-Conferen.963.0.html>. DOI: 10.5071/19thEUBCE2011-VP2.8.4

E. Pieratti, M. Baratieri, P. Baggio, M. Grigiante, S. Ceschini., "**A Biomass Steam Gasification Pilot Plant: Syngas Suitability for SOFC Stacks**" in Proceedings of the 3rd International Conference on Engineering for Waste and Biomass Valorisation, Albi: Ecole des Mines d'Albi-Carmaux, 2010, p. 301-306. Atti di: Wasteeng' 2010, Beijing, 17-19 May 2010. - URL: www.wasteeng.org

M. Baratieri, E. Pieratti, T. Nordgreen, M. Grigiante , "**Biomass Gasification with Dolomite as Catalyst in a Small Fluidized Bed: Experimental and Modeling Analysis**" in Proceedings of the 3rd International Conference on Engineering for Waste and Biomass Valorisation, Albi: Ecole des Mines d'Albi-Carmaux, 2010, p. 234-240. Atti di: WasteEng'2010, Beijing, 17-19 May 2010 . - URL: www.wasteeng.org

M. Ragazzi, M. Ischia, R. Dal Maschio, E.C. Rada, M. Grigiante, M. Baratieri, "**Disposal of PVC by pyrolysis: characterization of the process and lab-scale reactor tests**" in VENICE 2010, Third International Symposium on Energy from Biomass and Waste, Padova: CISA Publisher, 2010, p. [1]-[7]. - ISBN: 9788862650083. Atti di: VENICE 2010, Venezia, 8-11 November 2010

M. Baratieri, M. Grigiante, E. Pieratti, D. Antolini, P. Baggio, "**Experimental Gas Emissions Evaluation And Energy Balance Assesment of a Gasifying Wood Stove**" in WasteEng'2010, Albi : Ecole des Mines d'Albi-Carmaux, 2010, p. 252-259. Atti di: 3rd International Conference on Engineering for Waste and Biomass Valorisation, Beijing, 17-19 May 2010: www.wasteeng.org

A. Paganella, L. Fiori, P. Zambelli, C. Lora, L. Florio, D. Castello, R. Spinelli, M. Grigiante, M. Ciolli, "**Forest residues in the Autonomous Province of Trento: energetic valorization through combustion and gasification**" in Venice 2010, Third International Symposium on Energy from Biomass and Waste, Padova: Cisa Publisher, 2010, p. 1-13. - ISBN: 9788862650083. Atti di: Third International Symposium on Energy from Biomass and Waste, Venice, 8-11th November

M. Grigiante, M. Ischia, M. Baratieri, R. Dal Maschio, M. Ragazzi, "**Pyrolysis analysis and solid residue stabilization of polymers, waste tyres and sewage sludge**" in 3rd International Conference on Engineering for Waste and Biomass Valorisation, Albi: Ecole des Mines d'Albi-Carmaux, 2010, p. [1]-[6]. - ISBN: 9782951159181. Atti di: WasteEng'2010, Beijing, China, 17-19 may, 2010. - URL: www.wasteeng.org

G. Ionescu, M. Ischia, T. Apostol, R. Dal Maschio, M. Grigiante, M. Baratieri, M. Ragazzi, E.C. Rada, "**Disposal of plastic scraps arising from food and pharmaceutical industry: comparison between direct combustion and pyrolysis processes**" in 4th International Conference on ENERGY and ENVIRONMENT, Bucuresti: POLITEHNICA Press, 2009, p. [1-8]. Atti di: CIEM 2009, Bucharest, 12th-14th November 2009

M. Baratieri, P. Baggio, M. Grigiante, M. Bertoldi, S. Ceschini, L. Tognana, "**A 2-D thermodynamic analysis of a biomass gasification stage feeding a SOFC CHP**"

plant." in Atti 63° Congresso Nazionale ATI, Palermo: Flaccovio, 2008, p. 325-333. Atti di: 63° Congresso ATI, Palermo, 23-26 settembre. - URL: <http://ati2008.atiscilia.it/>

P. Baggio, S. Scalet, M. G. Cantiani, C. Colpi, M. Grigiane, **"District Heating in Alpine Communities: a Case study in the Primiero Valley"** in Proceedings of the 16th European Biomass Conference & Exhibition, Florence: ETA, 2008, p. 845-852. Atti di: 16th Biomass Conference and Exhibition, Valencia, 2nd-6th June 2008

M. Ischia, R. Dal Maschio, L. Tognana, M. Grigiane, M. Baratieri, M. Ragazzi, **"Effect of clay presence in the pyrolysis of wastewater sewage sludge"** in Second International Symposium on Energy from Biomass and Waste, Padova: CISA - Environmental Sanitary Engineering Centre, 2008, p. [n.d.]-[n.d.]. - ISBN: 9788862650045. Atti di: Venice 2008, Venice, 17th-20th November 2008

M. Ischia, R. Dal Maschio, L. Tognana, M. Grigiane, M. Baratieri, M. Ragazzi, **"Effect Of Clay Presence In The Pyrolysis Of Wastewater SewageSludge"** in VENICE 2008 - Secondo simposio internazionale su energia da biomasse e rifiuti, Venice: CISA, 2008, p. 238-245. Atti di: Venice2008, Venezia, 17-20 November 2008

E. Pieratti, F. Patuzzi, M. Baratieri, P. Baggio, M. Grigiane, **"Parametric analysis of small scale biomass gasification plants."** in Proceedings of the 16th European Biomass Conference: From Research to Industry and Markets, Firenze: ETA-Florence, 2008, p. 1019-1024. Atti di: 16th European Biomass Conference & Exhibition, Valencia (E), 2-6 June 2008. - URL: <http://p30322.typo3server.info/16th-European-Biomass-Conferen.229.0.html>

M. Baratieri, M. Grigiane, M. Ischia, M. Ragazzi, R. Dal Maschio, L. Tognana, E.C. Rada, **"Pyrolysis-vitrification process applied to disposal of sewage sludge and refinery sludge-comparison by energetical point of view"** in CHANIA 2008 1st international conference, Crete: Technical University of Crete, 2008, p. [1-8]. Atti di: Chania 2008: Hazardous Waste Mangement, Chania-Crete, 1-3 October 2008

C. Bagozzi, P. Baggio, P. Romagnoni, A. Gasparella, M. Baratieri, M. Grigiane, **"Simulazione tridimensionale del comportamento termodinamico di un edificio"** in Atti 63° Congresso Nazionale ATI, Palermo: Flaccovio, 2008, p. 467-472. Atti di: 63° Congresso Nazionale ATI, Palermo, 23-26 settembre 2008. - URL: <http://ati2008.atiscilia.it/>

P. Baggio, M. Baratieri, M. Grigiane, M. Bertoldi, S. Ceschini, L. Tognana, **"SOFC CHP plant fueled with biomass syngas: modeling the gasification stage"** in Proceedings of the World Renewable Energy Congress X and Exhibition, Glasgow: WREC Publisher, 2008, p. 135-142. Atti di: World Renewable Energy Congress X and Exhibition, Glasgow, Scotland (UK), 19-25 July

S. Scalet, M. G. Cantiani, C. Colpi, P. Baggio, M. Baratieri, M. Grigiane, **"Teleriscaldamento nelle località montane: un caso di studio nel Primiero"** in Proceedings 63° Congresso Nazionale ATI, Palermo: Flaccovio, 2008, p. 521-528. Atti di: 63° Congresso Nazionale ATI, Palermo, 23-26 settembre, 2008. - URL: <http://ati2008.atiscilia.it/>

C. Bagozzi, P. Baggio, A. Gasparella, M. Baratieri, M. Grigiane, **"Three dimensional dynamic analysis of the thermal behaviour of a building."** in Proceedings of the World Renewable Energy Congress X and Exhibition, Glasgow: WREC Publisher, 2008, p. 289-394. Atti di: World Renewable Energy Congress X and Exhibition, Glasgow, Scotland (UK), 19-25 July

L. Fiori, A. Lorenzi, M. Grigiante, P. Baggio, M. Baratieri, "**Analisi sperimentale del processo di estrazione di olio da semi di girasole con CO₂ supercritica**" in Atti del 62° Congresso nazionale dell'Associazione termotecnica italiana, Napoli: Cuzzolin Editore, 2007, p. 469-472. - ISBN: 9788887998771. Atti di: 62° Congresso nazionale dell'Associazione termotecnica italiana, Salerno, 11-14 settembre 2007. - URL: <http://www.ati07.unisa.it/>

P. Baggio, M. Baratieri, L. Fiori, M. Grigiante, "**Analisi sperimentale e modellazione numerica del processo di gassificazione di biomassa**" in Atti del 62° Congresso nazionale dell'Associazione termotecnica italiana, Napoli: Cuzzolin Editore, 2007, p. 473-478. - ISBN: 9788887998771. Atti di: 62° Congresso nazionale dell'Associazione termotecnica italiana, Salerno, 11-14 settembre 2007. - URL: <http://www.ati07.unisa.it/>

P. Baggio, M. Baratieri, L. Fiori, M. Grigiante, P. Tosi, "**Biomass Gasification Process: Experimental Analysis and Two-Phase Equilibria Modeling**" in From research to market development: 15th European Biomass Conference & Exhibition: proceedings of the international conference, Firenze: ETA, 2007, p. 834-843. - ISBN: 3936338213. Atti di: 15th European Biomass Conference & Exhibition, Berlin, 7th-11th May 2007

M. Grigiante, P. Baggio, M. Baratieri, "**Emissions Evaluation and Energy Balance of Combustion Processes Carried out on a Gasifying Wood Stove**" in Proceedings of Bioenergy2007 3rd International Bioenergy Conference and Exhibition, Jyvaskyla: FINPUB, 2007, p. 473-480. Atti di: BIOENERGY 2007, Jyvaskyla (FL), 3-6 September, 2007. - URL: www.finbioenergy.fi

P. Baggio, M. Baratieri, M. Grigiante, "**Energy performance of the biomass gasification process**" in SCIENTIFIC BULLETIN - "POLITEHNICA" UNIVERSITY OF BUCHAREST. SERIES C, ELECTRICAL ENGINEERING, v. 67, n. 4 (2007), p. 69-76. - URL: http://www.scientificbulletin.upb.ro/SeriaC__Inginerie_Electrica_si_Stiinta_Calculatoarelor.php?page=revistaonline&a=2&arh_an=2007&arh_ser=C&arh_nr=4

M. Grigiante, P. Baggio, M. Baratieri, "**Equilibrium Simulation of a Small-Scale Gasification Biomass CHP Plant**" in Proceeding Bioenergy 2007, Jyvaskyla: FINPUB, 2007, p. 465-471. Atti di: BIOENERGY 2007, Jyvaskyla, Finalnd, 3-6 September, 2007. - URL: www.finbioenergy.fi

L. Fiori, A. Lorenzi, M. Grigiante, P. Baggio, M. Baratieri, "**Experimental Evaluation of Sunflower Oil Extraction with Supercritical CO₂**" in Proceedings of the 15th European Biomass Conference & Exhibition, Firenze: ETA, 2007, p. 2016-2020. - ISBN: 3936338213. Atti di: 15th European Biomass Energy Conference, Berlino, Germania, 7th-11th May 2007

R. N. Dinu, M. Baratieri, P. Baggio, A. Badea, T. Apostol, M. Grigiante, "**Two-Phase Equilibrium Model of Multi-Stage Combustion Processes**" in From research to market development: 15th European Biomass Conference & Exhibition; proceedings of the international conference held in Berlin, Germany, 7 - 11 May 2007, Firenze: ETA, 2007, p. 1482-1487. Atti di: 15th European Biomass Energy Conference, Berlin, 7th-11th May 2007. - URL: <http://www.conference-biomass.com/index.htm>

• **Chapters of books**

M. Ischia, M. Grigiante, M. Baratieri, R. Dal Maschio "**Experiences on Pyrolysis of Waste, by Thermogravimetric and Lab-scale Reactor Approach**". Pyrolysis, Types, Processes and Industrial Sources. ISBN: 9781607416692 Chapter 13 (2009).

M.Ischia, M. Grigante, M.Baratieri, R. Dal Maschio “**Wastewater Sewage Sludge Disposal by Pyrolysis and Vitrification**“. Sewage Treatment: Uses, Processes and Impact. ISBN: 9781606929599. (2009).

M.Grigante “**Possibilità di produzione di idrogeno integrata ad impianti convenzionali di termovalorizzazione**“ Energia da Biomasse e Rifiuti. ISBN: 9788856803099 (2008).

**Language
competence**

First Certificate obtained on 1998: registered n° 3310/98

Trento, 31 August 2016

Signature: 