



UNIVERSITÀ DEGLI STUDI DELL'AQUILA

Prof. Katia Gallucci Curriculum scientifico

(Aggiornato il 2020/06/15)

1. Personal information

Name and SURNAME: Katia GALLUCCI

Nationality: Italian

2. CURRENT POSITION

Assistant Professor Positions in Industrial and Technological Chemistry

at University of L'Aquila, Department of Industrial and Information Engineering and Economics

National Scientific Qualification as Associate Professor in the Academic Recruitment Field 09/D3 ?
Chemical Plants and Technologies, expiring date 28/03/2023 (Article 16(1) Law 240/10)

3. EDUCATION

High school scientific diploma (Liceo Scientifico Statale A. Bafile, L'Aquila), grade 55/60

Master of Science in Chemical Engineering (University of L'Aquila), grade 110/110 cum laude. Thesis title: "Experimental study of a cold model of fluidized bed catalytic reactor" carried out at EVC / Inovyl, leader company in PVC production - Porto Marghera (VE) [T2]

PhD in Mathematical Modelling in Engineering (University of L'Aquila) Thesis title: "Fluid-dynamic characterization of multiphase systems", carried out at Laboratory of Fluid-Dynamics and Chemical Reactors of University of L'Aquila. [T1]

4. COMPUTER SKILLS

Information processing, Communication, Content creation, Safety: Proficient user

Problem solving: Independent user

- Proficient users of office suites (Microsoft Office Word, Excel, Power Point, Grapher,)
- Proficient users of internet browsers (Google Chrome, Mozilla Firefox, Microsoft Edge and Internet Explorer)
- Proficient users of operating systems (Windows, Linux)
- Proficient users of process simulators (CHEMCAD, CFX-4)
- Proficient user of mathematics applications (MATLAB-Simulink, Mathcad, Maple)
- Independent user of graphics applications (Paint, Photoshop, Animation Shop, AutoCAD)

5. Language SKILLS

For foreign languages, the reference is the Common European Framework of Reference for Languages (Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2 Proficient user).

English B2; French B2/B1.

6. Courses and Licences

January 2001: Licence for the exercise of engineering profession, obtained by successfully passing the State exam held in the 2nd session of 2001 at University of L'Aquila

January 2005: Member of Italian Association of Engineers - Province of L'Aquila

June 2005: Participation to "Numerical Methods and Hyperbolic Equations and Applications" course at University of Trento (Prof. E. Toro)

February-May 2007: Participation to "Organization of Construction Sites" course at University of L'Aquila (Prof. A. Ceradini)

June 2007: Licence for the exercise of safety coordinator during design and execution phases (Article 10 L.D. 494/96)

January 2018: Research activities in laboratories under Quality Management systems ISO 9001, member of Quality Committee in charge for the laboratory of Chemical Plants and Industrial Catalysis.

7. AFFILIATIONS

- Since 2019 member of **Società Chimica Italiana ? Divisione di Chimica Industriale ? Gruppo Interdivisionale di Catalisi**. Card n. 22282
- Since 2016 partner of **Gruppo di Ingegneria Chimica dell'Università (GR.I.C.U.)**

8. WORK EXPERIENCES

January-July 2002: Visiting Research Student (Erasmus fellowship) at University College London on "Particle Bed Model" simulation using CFX-4 commercial code

May-October 2004: Fixed-term contract at University of L'Aquila on "Experimental study of criteria for fluidization quality evaluation"

October 2004-October 2005: Annual post-doctoral research fellowship (ING-IND / 26 - Analysis, design and control of chemical processes, ING-IND / 24 - Fundamentals of chemical engineering, ING-IND/25 Chemical plants) entitled: "Experimental characterization and modelling of fluidized bed equipment" at University of L'Aquila

October-November 2005: Fixed-term contract at University of L'Aquila on "Study of homogeneous fluidization: collaboration for the final documentation and presentation of experimental results"

March-June 2006: Fixed-term contract at University of L'Aquila on "Dynamic wave measurement in homogeneous beds"

February-May 2007: Fixed-term contract at IMAST Scarl Technology District (Portici, NA) on PIROS project "Integrated design of multifunctional composite components in the railway field, associated to the setting up of special facilities for testing the behaviour of material and component subjected to flame conditions"

June 2006-June 2007: Annual post-doctoral research fellowship (ING-IND / 26 - Analysis, design and control of chemical processes, ING-IND / 24 - Fundamentals of chemical engineering, ING-IND/25 Chemical plants) entitled: " Hydro-gasification of coal and sequestration of carbon dioxide with calcium oxide "

August-November 2007: Fixed-term contract at University of L'Aquila on "Experimental research on various aspects of fluidization quality".

December 2007-November 2008: Annual post-doctoral research fellowship (ING-IND / 26 - Analysis, design and control of chemical processes) entitled: "Studies on key mechanisms of the behaviour of fluidized beds for applications in the process industry"

January 2010-July 2010: Collaboration on "Technical / economic feasibility study of urban district heating system of L'Aquila" - Agreement N ° 30001952 between University of L'Aquila and ENI S.p.A.

December 2008-March 2012: Assistant professor, fixed-term contract (Article 1(14) Law 230/05), funded under UNIQUE FP7 European Research Project: "Integration of particulate abatement, removal of trace elements and tar reforming in one biomass steam gasification reactor yielding high purity syngas for efficient CHP and power plants"

April 2012-at present: Assistant professor in Industrial and Technological Chemistry, Academic Recruitment Field 09/D3 "Chemical Plants and Technologies"

9. TEACHING ACTIVITY

A.Y. 2002-2003 - A.Y. 2008-2009: Teaching assistant of Matlab/Simulink applied to transfer functions ? course: "Analysis of continuous flow systems" course of MSc in Chemical Engineering at University of L'Aquila

A.Y. 2002-2003- A.Y. 2008-2009: Teaching assistant on "Analysis of pressure fluctuations in fluidized beds" and Laboratory Experiences for "Dynamics of heterogeneous systems" and "Processes of Generation of Fuels from Renewable Sources" courses of MSc in Chemical Engineering at University of L'Aquila

A.Y. 2008-2009 - A.Y. 2009-10: Teacher of "Biofuel Generation Processes" course (3 ECTS credits) of MSc in Chemical Engineering at University of L'Aquila

A.Y. 2009-2010:

- Teacher of "Practical elements of differential and integral calculus" (3 ECTS credits) course of BSc in Chemical Engineering at University of L'Aquila
- Teacher of "Thermal engineering and industrial energy systems" (3 ECTS credits) of BSc in Food Science and Technology in Viticulture and Enology at the University of Teramo;
- Courses for agricultural and forestry operators within the program agreement between the Ministry of the Environment and the Abruzzo Region (Additional Technical Protocol 2007 approved with DGR No. 100 of 2007).

A.Y. 2010-2011 - A.Y. 2012-13: Teacher of "Biofuel Generation Processes" course (9 ECTS credits) of MSc in Chemical Engineering at University of L'Aquila

A.Y. 2011-2012: Teaching assistant of Industrial Chemistry II course of MSc in Chemical Engineering at University of L'Aquila

A.Y. 2013-14 - A.Y. 2019-2020: Teacher of Industrial Chemistry (9 ECTS credits) course MSc in Chemical Engineering at University of L'Aquila

Content of course:

Chemical products classification. General criteria for chemical processes realization. Air separation. HCl synthesis from the elements. Absorption of corrosive gases. Synthesis gas: gasification of biomass and coal. H₂ production. Cleaning and conditioning of syngas. Ammonia synthesis. Nitric acid. Sulfuric acid and sulphur. Electrochemical processes. Biogas and Biomethane.

Main products of the industrial organic chemistry. Fossil fuels. Chemical use of natural gas. Methanol. Formaldehyde. Fischer-Tropsch synthesis. Synthesis of higher alcohols. MTBE. MTG, MTO processes. Thermal analysis: DSC, TG, DTA

The course provides the tools understand and deeply study important industrial processes for base chemicals. - be stimulated to apply the basic chemical concepts to industrial processes; - improve knowledge and understanding of industrial chemical processes; - be provided with calculation methods for equilibria, mass, and energy balances involved in chemical processes; - to assess criteria for developing sustainable chemical processes.

A.Y. 2019-2020: Teacher of "Introduction to Chemical Engineering Studies" (3 ECTS credits) course DSc in Industrial Engineering at University of L'Aquila

Content of course:

Introduction to the course. Units and dimension. Conversion of units. Systems of units. Dimensional homogeneity and dimensionless quantities and dimensionless problems. Scale-up rules.

Processes and process variables. Mass, volume and density. Mass and volumetric flow rate. Flow rate measurement. Chemical composition. Temperature and pressure: definition and measurement. Experimental measurements of viscosity and data processing.

Mass balances. Process classification: batch, continuous, and semi-batch processes. Principle of mass conservation. The general balance equation: meanings of terms. Balances on continuous steady-state processes. Degree-of-freedom analysis. Mass balance in reactive systems. Multiple reactions, yield, and selectivity. Case of study.

Since 2012 member of the Orientation and Tutoring Commission of the Department of Industrial Engineering and Information and Economics. She carried out a widespread action of:

- **dissemination** at High Schools in Abruzzo, Lazio and Marche and at the Student Fairs in Rome and Pescara, ?Going? in Ascoli Piceno related to the teachings of the Degree Courses of Industrial Engineering and Chemical Engineering,
- **seminars** about "Bio-energy and new materials design"
- **tutoring** during school-work alternation activities

Since 2010 Supervisor of more than 50 master's degree theses and of 3 doctoral theses.

Since 2018 Vice President of the Didactic Area Council (CAD) of the Master of Science in Chemical Engineering of the University of L'Aquila.

10. RESEARCH ACTIVITIES

Scientific research activities have been developed in the field of

Industrial and Chemical Plants and Processes

, in the development of systems, methods and technologies of chemical engineering, mainly applied **to produce fuels for sustainable, safe and innovative path with reduced environmental impact**, with particular attention to face **application- industrial issues**.

This occurred through the **development of catalysts and materials** applied for the **renewable energy** sources, **experimental and modelling studies** of the structural properties of materials and transformation processes, for the use of **innovative technologies and process intensification**.

In the sequel,

- the **study of analysis methods, development and design of processes** and plants based on chemical-physical transformation operations of the material;

- the **study of the influence of the selection and management of raw materials and catalysts**;
- the **development of analysis and modelling methodologies** for chemical systems, equipment, processes and plants;
- the **development of innovative technologies oriented to industrial applications**, with reference to sustainable, safe and low environmental impact technologies

will be explained through the description of the main scientific activities, developed within the fundamentals of the engineering of chemical reactions and catalytic chemical processes, and carried out through studies relating to:

1. **Fluid-dynamics of fluidized bed reactors, *cold modeling* and industrial applications**
2. **Carbon dioxide capture with and without simultaneous steam reforming of hydrocarbons**
3. **Biomass gasification and catalytic tar reforming systems and process intensification**
4. **Selective catalytic hydrogenation of vegetable oils**
5. **Development of catalysts and sorbent materials**
6. **Oxygen carrier materials for process intensification**

These activities allowed the candidate to be co-author of **47 papers** on international journals (one currently accepted for publication, two under revision) and of **8 book chapters**, over **90 conference proceedings** all submitted to national and international (in the majority) conferences, and they allowed the candidate to be ?Person in charge of the proposal? for two European projects and three extra-ministerial doctoral scholarships (two PON Research and Innovation 2014-2020 PhD grant - Innovative PhDs with industrial characterization and one Italian-French VINCI2018 scholarship).

11. QUALIFICATIONS

11.1. ORGANIZATION OR PARTICIPATION AS SPEAKER AT CONFERENCES

- Participation as **speaker** at AIChE 2005 Annual Meeting - Cincinnati, OH. [C89]
- Participation as **speaker** at MFIP2006 - 10th International Conference Multiphase Flow in Industrial Plant - Tropea (VV) Italy. [C88]
- Participation as **chairman and speaker** at HYSYDays 2007- 2nd World Congress of Young Scientists on Hydrogen - Turin, Italy [C84]
- Participation as **speaker** at Varirei 2007 - Valorisation and Recycling of Industrial Waste, L'Aquila, Italy. [C83]
- Participation as **speaker** at Congresso Nazionale ATI (Associazione Termotecnica Italiana) 2009.L'Aquila ? Montesilvano (PE), Italy.

[C74]

· **Organization and participation as speaker**

at workshop on "Energia da biomasse: prospettive di sviluppo tra innovazione tecnologica ed economia locale". L'Aquila, Italy.

- o 1st seminar: Anatone M., Gallucci K. "Attività di ricerca sull'utilizzo delle biomasse a scopi energetici"
- o 2nd seminar: Gallucci K. Foscolo P.U. "Produzione di gas combustibile pulito da biomasse mediante purificazione catalitica integrata nel reattore di gassificazione ? Progetto Europeo UNIQUE" (19-10-2011)

· Participation as **speaker**

at XVIII National Congress of the Chemistry Division Industrial Italian Chemical Society "Le sfide della chimica". Florence, Italy. [C62]

· Participation as **speaker**

at MFIP2014- 13th International Conference Multiphase Flow in Industrial Plant. Sestri Levante (Genova), Italy. [C49]

· Participation as **speaker**

at GPE " 4th International Congress on Green Process Engineering. Sevilla (Spain). [C50]

11.2. DIRECTION OR PARTICIPATION IN RESEARCH ACTIVITIES AT NATIONAL OR INTERNATIONAL LEVEL

Participation in the activities of the Fluid-Dynamics and Chemical Reactors research group of the University of L'Aquila, **project coordinator of PRIN 2003-2005: "Experimental and modelling characterization for granular fluid-solid systems in industrial processes"**, involving seven national research units.

Participation in the activities of the Fluid-Dynamics and Chemical Reactors research group of the University of L'Aquila, **project coordinator of PRIN 2005-2007 "Studies on key mechanisms of the behaviour of fluidized beds and their implementation in numerical simulation tools for applications in industrial processes"**

Participation in the activities of the Industrial Catalysis and Chemical Reactors research group of the University of L'Aquila on the studies proposed by the **ENEA (Casaccia Research Center)** in the context of "**Electrical System Research"**, **Program Agreements MiSE (Ministry of Economic Development) - ENEA, 2006-2011 on the topic: Clean coal and CCS** (Reports RdS / 2011 / 217, RdS / 2011/218, RdS / 2012/186, RdS / 2012/228).

Participation in the activities of the Industrial Catalysis and Chemical Reactors research group of the University of L'Aquila, **project coordinator of European Project FP7 UNIQUE G.A. n. 211517 : "Integration of particulate abatement, removal of trace elements and tar reforming in one biomass steam gasification reactor yielding high purity syngas for efficient CHP and power plants?"** (10 European partners of 7 different nationalities).

Participation in the activities of the Industrial Catalysis and Chemical Reactors research group of the University of L'Aquila on the studies proposed by the **ENEA (Trisaia Research Center)** in the context of "**Electrical System Research**", **Program Agreements MiSE (Ministry of Economic Development) - ENEA:**

? 2009-2011: Energy production from biomass and waste (Reports RdS/2010/176; RdS/2011/137, RdS/2011/141, RdS/2012/285)

? 2012-2014: Development of power generation from biomass and upgrading of biofuels (Reports RdS/2013/179, RdS/PAR2013/244, RdS/PAR2014/159).

? 2015-2017: Renewable energy sources (RdS/PAR2015/268)

Participation in the activities of the Industrial Catalysis and Chemical Reactors research group of the University of L'Aquila
, project partner of European Project FP7 EU-FCH UNIFHY 299732: ?UNIQUE gasifier for hydrogen production?, coordinated by the Telematic Marconi University, involving 9 partners.

Participation in the activities of the Industrial Catalysis and Chemical Reactors research group of the University of L'Aquila on the studies proposed by the **ENEA (Casaccia Research Center)** in the context of "**Electrical System Research**", **Program Agreements MiSE (Ministry of Economic Development) - ENEA:** 2012-2014 e 2015-2017 on the topic:

Capture and sequestration of CO₂ produced by the use of fossil fuels

(Reports RdS/PAR2013/264, RdS/PAR2013/292, RdS/PAR2014/249, RdS/2014/250, RdS/PAR2015/219, RdS/PAR2015/222).

Participation in the activities of the Industrial Catalysis and Chemical Reactors research group of the University of L'Aquila
, project partner of European Project FP7 ASCENT G.A. 608512: ?Advanced Solid Cycles with Efficient Novel Technologies?

active from March 2014 to February 2018. In addition to University of L'Aquila, the Work Package 4 (WP4 Sorption enhanced reforming looping cycle) counted as members the following European partners:

- ENEA (Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile, Italia);
- IFE (Institut for energiteknikk, Norvegia);
- CSIC (Consejo Superior de Investigaciones Científicas, Spagna);
- Marion technologies (France);
- INERIS (Institut national de l'environnement industriel et des risques, Francia);
- Politecnico di Milano.

11.3. RESPONSIBILITY OF STUDIES AND SCIENTIFIC RESEARCHES ENTRUSTED BY QUALIFIED PUBLIC AND PRIVATE INSTITUTIONS

Scientific Responsible of the annual post-doctoral fellowship: *"Experimental and modeling study of catalytic turbulent bed reactors for partial oxidation of hydrocarbons"*

awarded to Eng. A. Romano, in collaboration with Polynt S.p.A, (co-financing by University of L'Aquila 2014, CdD resolution of 24/7/2014). The study was conducted as part of a research grant and a scholarship funded by Polynt S.p.A. which led to the publication of the work related to the simulation of a turbulent fluidized bed reactor for the partial oxidation of n-butane to maleic anhydride (see RESEARCH ACTIVITIES. 1. Fluid-dynamics of fluidized bed reactors, *cold modeling* and industrial applications).

Scientific Responsible of the annual post-doctoral fellowship, subsequent renewal, awarded to PhD Francesco Ferella, entitled

"Optimization of process parameters for the industrial installation of membranes for the separation of carbon dioxide in the transition from biogas to biomethane"

[19]. The amount was entirely funded by the Abruzzo Region under the program agreement with the Ministry of the Environment, relating to the valorisation of biomass in the Abruzzo region (REBIOS), with resolution no. 562 of the Regional Council (June 30th, 2015).

Scientific Responsible of the research projects of interest to the University E.F. 2015 and 2016 entitled: *Upgrade of biogas to biomethane through the membrane for the separation of carbon dioxide (first and second year)*. The interest of **Think Eco Agri s.r.l.**

in pursuing the installation of a membrane for the removal of carbon dioxide, at the University of L'Aquila (UNIVAQ) finds a scientific partner to support the study on the updating process with membrane technology. The optimization of the process parameters would support the installation phases on an industrial scale. Other cold CO₂ separation technologies such as ionic liquids and zeolites are also considered, and whether **pilot and industrial scalability assessed after the experiments**

. The same methods have been used for the synthesis of exhausted FCC zeolites in order to use in the removal of pollutants from liquid waste.

Admitted to funding based on the **public notice for the funding of basic research activities**, art. 1, paragraphs 295 and following, of the law 11 December 2016 n. 232 (GU No. 297 of 21-12-2016 - Ordinary Supplement No. 57).

Scientific Responsible for the **additional PhD Scholarship**

with Innovative Industrial Characterization (Academic Year 2016/2017 - Cycle XXXII) entitled "**Selective catalytic hydrogenation of fatty acids of vegetable oils**" (DOT13LHQ8Y), funded by directorial decree n.353 on February 16th 2017, in the framework of the national operational program "**Research and Innovation**" (PON R&I 2014-2020). The company **Processi Innovativi Srl**, with its administrative office in L'Aquila and operating offices in L'Aquila and Rome, in the person of the managing director Ing. Gaetano Iaquaniello, was interested in the research subject, contributed to the management and operation costs of the doctorate and offered its collaboration and experience for the development of industrial aspects. The **ICPEES**

(Institut de chimie et procédés pour l'énergie, l'environnement et la santé) of the University of Strasbourg, in the person of Prof. Claire Courson, is involved in the proposed activities, also based on a co-tutorship agreement.

Scientific Responsible for the **additional PhD Scholarship**

with Innovative Industrial Characterization (Academic Year 2017/2018 - Cycle XXXIII) entitled "**Chemical technologies for CCU (Carbon Capture and Utilization)**" (DOT13LHQ8Y), funded by directorial decree n. 3749 on December 29th 2017, in the framework of the national operational program "**Research and Innovation**" (PON R&I 2014-2020). The project involves **APS S.p.A.**

, an engineering company with headquarters in Rome, present on the national and international market as an EPC contractor, whose core business is the Oil & Gas, but recently acquired projects including the petrochemical and bio-refinery interest [C17], and the Institute of Chemistry at the **University of Graz** (Austria) in particular, of the Bio-catalysis research group, in the person of Prof. Christoph Winkler.

Scientific Responsible of the research projects of interest to the University E.F. 2018 entitled "*Sorption Enhanced Reforming*". The main objective of the proposed research is the characterization of combined catalyst-sorbent materials suitable for industrial application of

Sorption Enhanced Steam Methane Reforming (SESMR) process. Scientific Responsible of the bi-annual post-doctoral fellowship awarded to PhD Andrea Di Giuliano, entitled:

Experimental and modelling study of materials for the steam reforming process of methane with simultaneous capture of CO₂

which provided for experimental and modelling activities carried out at the laboratory of fluid dynamics and chemical reactors, to deepen the knowledge acquired during the ASCENT European research project and to continue the research in its context. This allowed to complete the experiments started with the ASCENT project and to increase the publications on this topic.

Scientific responsible of the European research project LIG2LIQ (Cost Effective Conversion of Lignite and Waste to Liquid Fuels) co-funded by the Research Fund for Coal and Steel (RFCS) managed by European Commission (grant agreement n° 796585). Its aim is to

develop an economically efficient concept for production of liquid fuels from lignite and solid recovered fuel from municipal waste

, by means of the High Temperature Winkler (HTW) gasification technology and syngas valorisation (e.g. Fischer-Tropsch synthesis or methanol). LIG2LIQ activities started in August 2018, having a duration of 42 months; University of L'Aquila joined the project as a partner of Work Packages (WP)

1 Full-chain process definition and WP2 Fluidized bed gasification

. WP1 partners, besides University of L'Aquila, are:

- TKIS (THYSSENKRUPP Industrial Solutions AG, Germania)
- TUDA (Technische Universität Darmstadt, Germania)
- ICHPW (Instytut Chemicznej Przerobki Węgla, Polonia)
- RWE power AG (Germania)

while WP2, in which **University of L'Aquila is the WP leader**, partners are:

- TUDA
- CERTH (Center of Research and Technology Hellas, Greece)
- ICHPW

The main tasks:

- Task 1.3 Definition of test conditions (months 4-9) for the WP1
- Task 2.1 Assessment of fluidized bed quality for selected feedstock (months 7-24) for the WP2

Scientific Responsible of the European research project

CLARA (Chemical Looping gasification for sustainable production of biofuels)

funded by the Framework Program **Horizon 2020**

of the European Union (grant agreement n° 817841, LC-SC3-RES-21-2018 n° SEP40486610). It started in November 2018, having a duration of 4 years and aiming to study the production of biofuels, by **the chemical looping gasification of vegetal biomasses and Fischer-Tropsch synthesis on obtained clean syngas.**

University of L'Aquila is involved as a partner in this project, in the Work Package 2 *Development of a Concept for Pre-treatment of Straw*, with the following partners:

- CENER (Centro Nacional de Energías Renovables, Spain):
- FZJ (Forschungszentrum Jülich, Germany).

In the WP2, University of L'Aquila must manage the Task 2.3

: *Assessment of fluidized bed gasification quality for different biomass feedstock and with different bed materials* (months 4-21)?.

Allocation of the 2018 VINCI funding (Chapter 3 - Doctoral contract for joint supervision thesis Project number: C3-1769) by the Executive Council of the Franco-Italian University (UFI) which awarded a doctoral contract for the thesis of joint supervision entitled

"Study of the coupling of a reforming process with steam and water gas shift enhanced by a CO₂ capturing material and an H₂

S absorption system for the production of a hydrogen-rich gas starting from biomethane or bio-syngas

". The first results have been presented [C8] and further developments will be presented in [C1, C2].

11.4. MEMBER OF COUNCIL OF PhD PROGRAMS ACCREDITED BY MIUR (MINISTRY OF EDUCATION, UNIVERSITY AND RESEARCH)

Member of PhD Council in "Systems and methods for the management of electrical and thermal energy from renewable and assimilated sources and for sustainable construction" at University of L'Aquila.

Coordinator: Prof. Carlo Cecati:

- Academic Year 2010/11 Cycle XXVI ? Duration: 3 years
- Academic Year 2011/12 Cycle XXVII - Duration: 3 years
- Academic Year 2012/13 Cycle XXVIII - Duration: 3 years

Seminar: "Thermo-chemical and bio-chemical processes of biomass energetic conversion" (27/09/2012)

Member of PhD Council in "Industrial and Information Engineering and Economics" at University of L'Aquila Coordinator: Prof. Roberto Cipollone

- Academic Year 2013/14 Cycle XXIX ? Duration: 3 years
- Academic Year 2014/15 Cycle XXX - Duration: 3 years
- Academic Year 2015/16 Cycle XXXI - Duration: 3 years
- Academic Year 2016/17 Cycle XXXII ? Duration: 3 years
- Academic Year 2017/18 Cycle XXXIII - Duration: 3 years
- Academic Year 2018/19 Cycle XXXIV - Duration: 3 years

Member and vice -coordinator of PhD Council in "Industrial and Information Engineering and Economics" at University of L'Aquila. Coordinator: Prof. Giuseppe Ferri

- Academic Year 2019/20 Cycle XXXIV - Duration: 3 years

11.5. INTERNSHIP ABROAD AT INTERNATIONAL RESEARCH INSTITUTES AND UNIVERSITIES

6-month study and research program at University College London under the supervision of Prof. Paola Lettieri, head of the research group in "Multiphase Systems" of the Department of Chemical Engineering. In the framework of a **Socrates-Erasmus fellowship**

(AA2001-2002) gained during the second year of the doctorate, the experience was focused on the theme of the **simulation of the Particle Bed Model (PBM) as predictive model of the behaviour of reactors at fluidized bed**

, using the commercial software CFX4 / AEA, a powerful tool for investigating multi-component dynamic fluid behaviour.

Internships abroad with international staff mobility programm

(Erasmus+ Mobility for traineeships A.Y. 2018/2019)

for a 14 days training period at the following foreign office of the

Institut de chimie et procédés pour l'énergie, l'environnement et la santé (ICPEES) of the University of Strasbourg(official working languages: English and French).

11.6. ACTIVITY OF TECHNOLOGY TRANSFER

Partner from the founding date (2008, October 10th) to the transfer of the company shares (2012, June 1st) **of limited partnership under the company "KAPTARE S.A.S. by Tocchio Arianna & C. BNR Gruppo Energia "** VAT number **01757150667** with headquarters in Barisciano (AQ) via F. Salomone n.5. **Scientific Responsible** for the agreement between **ALMA C.I.S. S.R.L.**

and the Department of Industrial and Information Engineering and Economics - University of L'Aquila for the financing of n. 1 Semi-annual scholarship for the **characterization of biomass and pyrolysis and gasification tests**, in details:

- characterization of TGA-DSC and / or muffle materials; CHNS and XRF
- devolatilization / pyrolysis tests of single pellets with analysis of permanent gases.
- ash analysis.
- support for the start-up of a 300kW thermal plant at the ALMACIS headquarters.

Activities of **verification for the Regional Administrative Court (TAR) for Abruzzo**

: the Regional Administrative Court for Abruzzo with Ordinance No. 723/2014 REG.PROV.COLL. has arranged a verification on the appeal general register number 582 of 2012 on the appeal number 613 /2012 for the cancellation of the determination No. 13/103 (17/05/2012) of the Abruzzo Region for the construction and operation of a power plant.

11.7. OTHER PROFESSIONAL WORK EXPERIENCE AND SKILLS

Participation in the activities of the **Technological District Innovation, Quality and Food Safety** funded by the contribution to research projects for technological innovation (DM 28499):

1) projects carried out with CIPE (Inter-ministerial Committee for Economic Planning)/FPA (Framework Program Agreement) financing, research project

PR5 - Enhancement of production surpluses, by-products and processing waste; realization objective OR2 - Production services;

2) projects approved with CIPE/FPA funding during the preliminary investigation and amendment phase (start of activity 31/12/2012), to

enhance methodologies and scientific knowledge of the of research centres, PR12 - Study and design of a multimedia infrastructure system for the development of scientific, economic and management activities

of the Technological District "Quality and Safety of Food". The contribution of the candidate consisted in the conduct of the studies, in the drafting of the half-yearly and final reports, in the compilation and collection of the information sheets, in the participation in the meetings and events (Casa Abruzzo Milan, 2015 July3-4th) and in the financial statement of the UR3 research unit, headed by prof. Pier Ugo Foscolo.

Collaboration contract for carrying out support and assistance activities in the scientific field for SMEs, as part of the **PIROS project "Integrated design of multifunctional components for applications in the railway sector and medium-sized carriers, associated with the creation of special facilities for testing and qualification of materials in flame conditions "**at the **IMAST Scarl Technology District (Portici, NA).**

Specialized technical assistance for the technical/economic feasibility study of the urban district heating system of L'Aquila - Contract No. 30001952 signed by the University of L'Aquila with **ENI S.p.A**. In May 2009, ENI signed with the Ministry of Education, University and Research and with the University of L'Aquila, an agreement protocol for carrying out a **feasibility study for the realization of a district heating plant with high environmental sustainability for the supply of green energy to the city**

. For this study, Enipower group signed a contract with the Department of Chemistry, Chemical Engineering and Materials for establishing a Working Group (WG). The requested collaboration was divided into three Work Packages, concerning:

- WP1 - Thermal utility and urban district heating load diagram
- WP2 - Availability of biomass and supply plan assumptions

Member of the Advisory Committee of the European project IEE 10/130 Bio-methane Regions: in relation to the note of the Abruzzo Region of 23 January 2013 Prot. RA / 19758, the candidate was involved in the project and

provided technical and scientific support in the elaboration of three pre-feasibility studies for biogas / biomethane plants, for three local companies

. As envisaged in the project implementation guidelines, the candidate, in addition to participating in the project meetings, held **technical and dissemination seminars**

relating to the results achieved. On 2013 October 15th

, a technical seminar was held at the Faculty of Engineering of L'Aquila for technicians and stakeholders in the Biogas and Biomethane field:

- Abruzzo Region - presentation of the project
- Upgrading technologies from biogas to biomethane - Katia Gallucci
- Upgrading of a biogas plant to biomethane pre-feasibility study - Sara Contestabile

Reviewer for international scientific journals:

- ACS Omega

- Applied Catalysis A
- Applied Catalysis B: Environmental
- Bioresource Technology
- Catalysis Science & Technology
- Catalysis Today
- Chemical Engineering Transactions Journal
- Chemical Engineering and Processing: Process Intensification
- Chemical Engineering Journal
- Chemical Engineering Research and Design
- Chemical Engineering Science
- Energy
- Energy & Fuels
- Energy Conversion and Management
- Energy Technology
- Environmental Science & Technology
- Fuel
- Fuel Processing Technology
- Inorganic Chemistry
- International Journal of Energy Research
- International Journal of Hydrogen Energy
- Journal of Cleaner Production
- Journal of CO₂ Utilization
- Journal of Environmental Management
- Journal of Industrial and Engineering Chemistry
- Powder Technology
- Renewable & Sustainable Energy Reviews

12. SCIENTIFIC PUBLICATIONS

12.1. PEER-REVIEWED SCIENTIFIC ARTICLES

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- [2] Di Giuliano, A., **Gallucci, K.**, Foscolo, P.U. (2020) Determination of Kinetic and Diffusion Parameters Needed to Predict the Behavior of CaO-Based CO₂Sorbent and Sorbent-Catalyst Materials. *Industrial & Engineering Chemistry Research*, Publication Date (Web): February 17, 2020, doi: 10.1021/acs.iecr.9b05383.
- [3] Antonini, T., Di Carlo, A., Foscolo, P.U., **Gallucci, K.**, Stendardo, S. (2019) Fluidized bed reactor assisted by Oxygen Transport Membranes: Numerical simulation and experimental hydrodynamic. *Chemical Engineering Journal*, 377, art. no. 120323. doi: 10.1016/j.cej.2018.11.021.
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- [9] Di Giuliano, A., **Gallucci, K.**, Foscolo, P.U., Courson, C. (2019) Effect of Ni precursor salts on Ni-mayenite catalysts for steam methane reforming and on Ni-CaO-mayenite materials for sorption enhanced steam methane reforming. *International Journal of Hydrogen Energy*, 44 (13), pp. 6461-6480. doi: 10.1016/j.ijhydene.2019.01.131.
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12.2. BOOK CHAPTERS

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