



Personal Information

Name Piero Ciccioni

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Nationality Italian

Date of birth 20/11/1974

Gender Male

Current Occupation

Researcher at the Institute for Agricultural and Forestry Systems of the Mediterranean of the Italian National Research Council (ISAFoM-CNR), Perugia branch, Via della Madonna Alta, 128, 06128, Perugia, PG, Italy.

Work experience

Dates January 2022 – Current

Occupation or position held

Adjunct Professor of "Global Changes and Human Resilience" at the University for Foreigners of Perugia.

Main activities and responsibilities

Contract teaching in "Global Changes and Human Resilience" held for the Degree Course in International Studies for Sustainability and Social Safety (SIS) of the University for Foreigners of Perugia.

The course is mainly aimed at making students acquire knowledge on the following topics:

- The global changes currently ongoing and their main impacts on natural, socio-economic and cultural resources;
- The difference between 'green' and 'nature-based solutions', the effectiveness of the latter approach in adapting to global changes, the main 'nature-based solutions' currently available in their different application sectors;

<p>Name and address of employer Type of business or sector</p>	<ul style="list-style-type: none"> • The difference between 'green' economic models and 'different economies', the main solutions underlying the latter approach and their relationship with the community and the territory, the main characteristics of 'cultural districts' and 'civic economy'; • The main impacts of global changes on society, main technological, policy and civic engagement solutions aimed at producing resilient and sustainable urban design, such as 'renewable energy communities', the recovery of 'residual spaces' and the general principles of 'metabolic and adaptive' urban planning. <p>In general, the teaching aims to make students acquire knowledge on the main solutions of anthropic adaptation to global changes that can be implemented in each of the three dimensions of sustainable development in order to increase human resilience and decrease the ecological footprint.</p> <p>University for Foreigners of Perugia, Piazza Braccio Fortebraccio, 4, 06123, Perugia, PG, Italy. University teacher on environmental sustainability, green and circular economy, carried out as part of the extra-institutional activities for the qualification of personnel granted by the CNR.</p>
<p>Dates Occupation or position held</p>	<p>April 2020 - Current</p> <p>As a researcher at ISAFoM-CNR (Perugia branch), he is currently a scientific collaborator of the International PRIMA Project "SUSMEDHOUSE" of which ISAFoM-CNR coordinates the Work Package 6. The project is aimed at developing high-tech agricultural greenhouses that are sustainable and managed through artificial intelligence. Specifically, Work Package 6 is dedicated to the creation of innovative and environmentally-friendly '<i>soilless growth media</i>' that allow vegetable species to develop without the use of chemical fertilizers and with little water.</p>
<p>Main activities and responsibilities</p>	<ul style="list-style-type: none"> • Collaboration in the conception, development and presentation of the technical-scientific contents related to the research activities of Work Package 6 included in the project proposal. • Selection of zeolitic materials potentially suitable for experimentation (e.g. high cation exchange capacity, good water absorption and water vapor adsorption capacity) and their characterization by means of XRPD-RIR, CEC AMAS, FTIR-ATR, TGA-DTG-DTA and ¹⁹Si and ²⁷Al MAS NMR solid-state spectroscopy, in order to verify its actual performance as natural soil improvers as well as materials capable to improve <i>water use efficiency</i>. • Determination of the agronomic properties of soils produced by mixing the selected zeolites with different composts made by ISAFoM-CNR starting from food waste ('<i>zeo-compost</i>' type mixtures). • Critical analysis of the results obtained and their presentation in the <i>ad-interim</i> and final reports of the project.
<p>Name and address of employer Type of business or sector</p>	<p>Institute for Agricultural and Forestry Systems of the Mediterranean of the National Research Council (ISAFoM-CNR), Perugia branch, Via della Madonna Alta, 128, 06128, Perugia, PG, Italy. CNR research activities on the optimization of the use of natural resources in agricultural and forest ecosystems.</p> <p>Full name of the project: "<i>SUSEMDHOUSE - Efficient, Eco-Friendly, Sustainable Mediterranean Greenhouse Integrated with Artificial Intelligence, Hi-Tech Automation and Control System</i>". Project duration: three years. Program and call: International Program PRIMA, call 2019, Section 1 "<i>Farming Systems (Innovation Action)</i>". Project funding: total funding of € 1,549,990, of which a quota of € 210,000 has been allocated for research activities under the responsibility of ISAFoM-CNR. Project partners: ARTECS (Leading Partner, Turkey), ISAFoM-CNR (Italy), Fraunhofer ISE (Germany), AVIPE (Portugal), Antalya Tarım (Turkey), WOLA (Spain), PROTEUS (Egypt).</p>
<p>Dates Occupation or position held</p>	<p>October 2021 – September 2022</p> <p>Adjunct Professor of "<i>Green and Circular Economy</i>" at the University for Foreigners of Perugia.</p>

Main activities and responsibilities

Contract teaching in "Green and *Circular Economy*" held for the Degree Course in International Studies for Sustainability and Social Safety (SIS) of the University for Foreigners of Perugia.

The course was mainly aimed at making students acquire the following knowledge:

- Basic knowledge on the principles of sustainable development and environmental sustainability;
- In-depth knowledge on renewable and non-renewable resources, on the main uses made of them by man and on the state of the art of technologies and good practices useful for promoting sustainable management;
- In-depth knowledge on the principles of the '*green economy*' and the '*circular economy*', on the state of the art of these two economic models in Italy and on the main European policies aimed at stimulating them;
- Basic knowledge on '*blue economy*' and biomimicry.

In general, the teaching was aimed at providing students with a rigorous vision of the main economic models, technologies and *policies* dedicated to environmental sustainability.

**Name and address of employer
Type of business or sector**

University for Foreigners of Perugia, Piazza Braccio Fortebraccio, 4, 06123, Perugia, PG, Italy.

University teacher on environmental sustainability, green and circular economy, carried out as part of the extra-institutional activities for the qualification of personnel granted by the CNR.

Dates

November 2019 – September 2022

Occupation or position held

As a researcher at ISB-CNR (formerly IMC-CNR), he has been **Project Manager** of the **European Erasmus+ Project "CHERISH"**, aimed at developing an advanced educational program on the topics of sustainable valorization of Non-Reproducible Goods (Cultural and Natural Heritage) and sustainable tourism, dedicated to teachers and trainees of the VET system as well as the university system.

Main activities and responsibilities

- Conception, development and presentation of the project proposal.
- Finalization of the *project work plan*, definition of the training objectives to be achieved by end-users, coordination of activities concerning the development of the educational program.
- *Desk analysis on the state of the art of sustainable tourism and valorization of Non-Reproducible Goods (NRGs) in Italy and production of a national report on these topics.* Production of interviews with companies that are virtuous examples in the fields of sustainable tourism and valorization of NRGs.
- Development of teaching modules in the form of Open Educational Resources (OERs), produced accordingly to ECVET standard criteria, on the topics of the management of Non-Reproducible Goods in the three dimensions of Sustainable Development, ecotourism, the state of the art of intervention tools aimed at operationally promoting the sustainable valorization of complex naturalistic-cultural systems and on the main GIS (Geographic Information Systems) IT tools for integrated territorial management. Revision and fine-tuning of the teaching modules produced by the other project partners.
- Testing of the project products at selected upper-secondary and post-secondary education institutions, higher technical institutes, university departments and training centers, through seminars, workshops and lectures.
- Dissemination of the project results at international events, organized in the five EU countries involved in the project.
- Critical analysis of the results obtained and their presentation in two *ad-interim* project reports and in the final one.

Name and address of employer

Institute for Biological Systems of CNR (former Institute of Chemical Methodologies of CNR), Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, Italy.

Type of business or sector

Research and development of Open Educational Resources on sustainable tourism and sustainable management of Cultural Heritage and Natural Capital.

Full name of the project: "*CHERISH - Cultural and Natural HERitage: a Sustainable tourism VET Integrated approach*".

Programme and call: Erasmus+ European Programme, call 2018, Key Action 2 "*Cooperation for Innovation and Exchange of Good Practices*".

Project duration: three years.

Project funding: total funding of € 324,930, of which a quota of € 74,550 has been allocated for

research and development activities under the responsibility of ISB-CNR.

Project partners: ISB-CNR (Leading Partner, Italy), Fundación General de la Universidad de Salamanca (Spain), AllWeb Solutions (Greece), Eurotracks (France), Dobrich CoC (Bulgaria), Erfap Lazio (Italy).

The Erasmus+ Programme panel of experts who carried out the final evaluation of the project judged CHERISH as an "**Example of Good Practice**" at European level in the Erasmus+ context, as reported in the official Dissemination Platform of the Programme:

<https://erasmus-plus.ec.europa.eu/projects/search/details/2019-1-IT01-KA202-007440>

Dates

May 2022 – June 2022

Occupation or position held

Trainer for the University Training Course "Turismo Sostenibile per la Valorizzazione del Patrimonio Naturale e Culturale", held at the University for Foreigners of Perugia and open to students of all the Degree Courses of the aforementioned University.

Main activities and responsibilities

Conception and implementation, in agreement with the University for Foreigners of Perugia, of a short training course on the topics of the subsisting relationships between Non-Reproducible Goods (i.e. Natural and Cultural Heritage) and the three dimensions of sustainable development, risks and dangers for their conservation, state-of-the-art technologies for their protection, the three dimensions of sustainable tourism (ecotourism, responsible tourism and development tourism) and on emerging sustainable tourism activities (from ecomuseums to eco-hotels).

The course took place from May 23rd to June 10th 2022, was held in distance learning and was made available to all students of the University for Foreigners of Perugia. It lasted a total of ten hours and was divided into five seminars, four of which were held by the head of the course itself, Dr. Piero Ciccioni, and one by Dr. Cristina Di Salvo, researcher at IGAG-CNR. 2 University Credits (CFU) were awarded to students who had attended at least 80% of the seminars and presented, during a sixth final meeting, an in-depth paper on one of the topics addressed in the course.

Name and address of employer

Institute for Agricultural and Forestry Systems of the Mediterranean of the National Research Council (ISAFoM-CNR), Perugia branch, Via della Madonna Alta, 128, 06128, Perugia, PG, Italy, in collaboration with the University for Foreigners of Perugia, Piazza Braccio Fortebraccio, 4, 06123, Perugia, PG, Italy.

Type of business or sector

University training on sustainable tourism and sustainable management of Cultural Heritage and Natural Capital, carried out as part of the free collaboration between Public Research Institutions and Universities.

Dates

May 2021 – June 2021

Occupation or position held

Trainer for the University Training Course "Sostenibilità Ambientale, Risorse Naturali ed Economia Circolare", held at the University for Foreigners of Perugia and open to students of all the Degree Courses of the aforementioned University.

Main activities and responsibilities

Conception and implementation, in agreement with the University for Foreigners of Perugia, of a short training course on sustainable development, environmental sustainability, renewable and non-renewable resources, principles of green and circular economy and on approaches, enabling technologies and good practices aimed at promoting a sustainable use of natural resources.

The course took place from May 17th to June 3rd 2021, was held in distance learning and was made available to all students of the University for Foreigners of Perugia. It lasted a total of ten hours and was divided into five seminars, four of which were held by the head of the course itself, Dr. Piero Ciccioni, and one by Dr. Roberto Altieri, also a researcher at ISAFoM-CNR, Perugia branch. 2 University Credits (CFU) were awarded to students who had attended at least 80% of the seminars and presented, during a sixth final meeting, an in-depth paper on one of the topics addressed in the course.

Name and address of employer

Institute for Agricultural and Forestry Systems of the Mediterranean of the National Research Council (ISAFoM-CNR), Perugia branch, Via della Madonna Alta, 128, 06128, Perugia, PG, Italy, in collaboration with the University for Foreigners of Perugia, Piazza Braccio Fortebraccio, 4, 06123, Perugia, PG, Italy.

Type of business or sector

University training on environmental sustainability and green and circular economy, carried out as part of the free collaboration between Public Research Bodies and Universities.

<p>Dates</p> <p>Occupation or position held</p>	<p>September 2018 – April 2021</p> <p>As a researcher at IMC-CNR, he has been Scientific Director of the survey campaign commissioned by the Rectory of Sant'Agnese in Agone Church and aimed at surveying the quality of the walls of the Crypt of the Church, making the geological characterization of the stone materials used for their realization, and designing, developing and implementing an experimental protocol dedicated to verify the efficiency of the pilot plant installed in the crypt for the regulation of the indoor conditions of the site by means of air conditioning and dehumidification actions.</p>
<p>Main activities and responsibilities</p>	<ul style="list-style-type: none"> • Characterization of the quality of the stone walls of the crypt and their composition in terms of lithotypes used; identification and characterization of the types of stone material and surface coating present in the walls of the crypt by means of XRPD, TGA-DTA-DTG and FT-IR analysis. • Development of possible operational solutions to limit the impact of the degradation phenomena detected and, more specifically, of an experimental protocol for the evaluation of the effects produced on the thermo-hygrometric conditions to which the masonry materials of the Crypt are subjected by the pilot air conditioning and dehumidification plant installed on the site. • Development and implementation of an experimentation aimed at verifying the effectiveness of the pilot plant to improve indoor thermo-hygrometric conditions in the crypt. • Critical <i>ex-post</i> analysis and presentation of the results obtained in a dedicated technical-scientific report.
<p>Name and address of employer</p>	<p>Institute of Chemical Methodologies of the CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, Italy, commissioned by Rettoria di S. Agnese in Agone, Piazza Navona – Via S. Maria dell'Anima, 30 / A, 00186, Rome, Italy.</p>
<p>Type of business or sector</p>	<p>CNR research activities in the field of new technologies for the conservation of Cultural Heritage and for the regulation of microclimatic conditions in indoor environments.</p> <p>Name of the commission: " <i>Attività di risanamento ambientale della Cripta di Sant'Agnese in Agone, Roma</i>".</p> <p>Programme and call: consultancy agreement concluded directly between the parties.</p> <p>Duration of the research activity: three years.</p> <p>Funding of research activities: funding of € 6,100 allocated each year for survey and experimentation activities under the responsibility of IMC-CNR.</p> <p>Partners of the research activity: IMC-CNR (Scientific Manager), IGAG-CNR, IREA-CNR.</p>
<p>Dates</p> <p>Occupation or position held</p>	<p>June 2017 – June 2019</p> <p>As a researcher at IMC-CNR, he has been Scientific Director of the Project Operational Unit 3 involved in the BRIC INAIL National Project "FREEFORES", coordinated by the Department of Biology, Agriculture and Food Sciences of the CNR.</p>
<p>Main activities and responsibilities</p>	<p>The project was aimed at developing new organic and inorganic binders that can replace formaldehyde-based adhesives currently used for bonding wooden materials in the building and furniture manufacturing sectors.</p> <ul style="list-style-type: none"> • Conception, development and presentation of the technical-scientific contents related to the research activities of the Project Operational Unit 3 included in the project proposal. • Development of a methodology for the rapid and <i>real-time</i> measurement of formaldehyde (HCHO) and other volatile organic compounds (VOCs) emissions from both industrially used glues and those developed in the project and from wood materials glued to them. • Formulation, synthesis and physical and chemical characterization of new geopolymeric inorganic resins that can be used as an alternative to formaldehyde-containing adhesives commonly employed in construction and in the production of furniture with wooden matrix. • Determination of the adhesive properties of geopolymeric materials, through gluing tests on different types of wood substrates for structural use. • Critical analysis of the results obtained and their presentation in the <i>ad-interim</i> and final reports of the project.
<p>Name and address of employer</p>	<p>Institute of Chemical Methodologies of CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Piero Ciccioli</p>

<p>Type of business or sector</p>	<p>Monterotondo, Rome, Italy.</p> <p>Applied research in the field of new materials and processes aimed at improving health and safety in <i>indoor</i> environments.</p> <p>Full name of the project: "FREEFORES: Sviluppo di nuovi collanti a base organica e inorganica come sostitutivi delle resine contenenti formaldeide nei prodotti legnosi utilizzati nell'edilizia e negli arredi".</p> <p>Program and call: INAIL National Program, BRIC 2016 call, Sector ID-06: "Sviluppo di soluzioni tecnologiche e organizzative finalizzato alla sostituzione della formaldeide nei processi produttivi e verifica dell'efficacia delle misure di mitigazione dell'esposizione messe in atto".</p> <p>Project duration: two years.</p> <p>Project funding: total funding of € 350,000, of which a quota € 107,187 has been assigned to Project Operational Unit 3 led by IMC-CNR. The project was co-financed by CNR for a quota equal to 42.8% of the total.</p> <p>Project partners: DISBA-CNR (Leading Partner), IMC-CNR, ISTECC-CNR, IVALSA-CNR, ISA-CNR and INAIL Operating Unit.</p>
<p>Dates</p> <p>Occupation or position held</p>	<p>September 2016 – December 2018</p> <p>As a researcher at IMC-CNR, he has been Project Manager of the European Erasmus+ Project "EN-VET", aimed at developing an advanced teaching program on the topics of environmental sustainability, <i>green & circular economy</i> and sustainable development, dedicated to teachers and trainees of the VET system as well as the university system.</p>
<p>Main activities and responsibilities</p>	<ul style="list-style-type: none"> • Conception, development and presentation of the project proposal. • Finalization of the <i>project work plan</i>, definition of the training objectives to be achieved by end-users, coordination of activities concerning the development of educational programs. • <i>Desk analysis</i> on the state of the art of sustainable development in Italy and production of a national report on environmental sustainability. • Production of interviews on selected case studies among national companies that are active in the fields of R&D of sustainable technologies and <i>green & circular economy</i>. • Development of teaching modules, produced accordingly to ECVET standards, on the topics of sustainable management of natural resources and <i>low-carbon economy</i>. Revision and fine-tuning of the teaching modules produced by the other project partners. • Testing of the project products at selected upper-secondary and post-secondary education institutions, higher technical institutes, university departments and training centers, through seminars, workshops and lectures. • Dissemination of the project results at international events, organized in the five EU countries involved in the project. • Critical <i>ex-post</i> analysis of the results obtained, production of the <i>ad-interim</i> and final reports of the project.
<p>Name and address of employer</p>	<p>Institute of Chemical Methodologies of CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, Italy.</p>
<p>Type of business or sector</p>	<p>Research and development of Open Educational Resources on environmental sustainability, <i>green & circular economy</i> and sustainable development.</p> <p>Full name of the project: "EN-VET- Environment in the VET system: a powerful tool for the future".</p> <p>Project duration: two years.</p> <p>Programme and call: Erasmus+ European programme, call 2016, Key Action 2 "Cooperation for Innovation and Exchange of Good Practices".</p> <p>Project funding: total funding of € 314,940, of which a quota € 71,585 has been allocated for research and development activities under the responsibility of IMC-CNR.</p> <p>Project partners: IMC-CNR (Leading Partner, Italy), Fundación General de la Universidad de Salamanca (Spain), Kaunas Science and Technology Park (Lithuania), Time Associates (UK), CLEAN Cluster (Denmark), Istituto di Istruzione Superiore Piaget-Diaz (Italy).</p> <p>The Erasmus+ Programme panel of experts that carried out the final evaluation of the project judged EN-VET as an "Example of Good Practice" at European level in the Erasmus+ context, as reported in the official Dissemination Platform of the Programme:</p> <p>https://ec.europa.eu/programmes/erasmus-plus/projects/eplus-project-details/#project/2016-1-IT01-</p>

[KA202-005387](#).

The Project was also selected by the CNR as one of the **90 CNR Third Mission Case Studies** for the **VQR 2015-2019** (https://prodotti-vqr.cineca.it/web/app.php/cerca_terza) and contributed to ensure that the Institution has obtained excellent evaluations in this interdisciplinary area, ranking first among all the National Public Research Institutions (https://www.anvur.it/wp-content/uploads/2022/04/Risultati_VQR_2015_2019.pdf, p. 45).

Dates

September 2013 – December 2017

Occupation or position held

As a researcher at IMC-CNR, he has been **Scientific Director** of the IMC-CNR **Project Operational Unit** involved in the implementation of the Objective No. 3 "Demufacturing", with responsibility for Activity 3.4.3 "Production of geopolymers from industrial residues, such as foundry residues or fly-ash", of the **National Cluster Project "Sustainable Manufacturing"**, aimed at establishing of a public-private technological cluster at national level, for the development, within the project itself, of enabling technologies aimed at increasing the environmental sustainability of processes, production systems and factories.

Main activities and responsibilities

- Development of new formulations for the synthesis of geopolymers starting from fly ash emitted by incineration plants equipped with systems for reducing pollutants in the fumes.
- Determination of the chemical reactivity of fly ash produced by different plants in the synthesis reaction of geopolymers.
- Determination of chemical and mineralogical features as well as of the content of organic micropollutants in different fly ash produced by municipal solid waste incineration plants without and with acid and NOx abatement systems.
- Chemical, physical and mechanical characterization of the geopolymeric materials obtained and assessment of their performance for building applications.
- *Critical ex-post* analysis and presentation of the results obtained in a dedicated technical-scientific report.

Name and address of employer

Institute of Chemical Methodologies of the CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, Italy.

Type of business or sector

CNR research activities in the field of new technologies for the circular use of secondary raw materials of industrial origin in the formulation and synthesis of materials with high physical and mechanical performance.

Full name of the project: "Sustainable ManuFacturing".

Program and call: MIUR funds for the establishment of the National Technology Cluster "Smart Factory".

Project duration: three years.

Project funding: total funding of € 8,870,330, of which a quota of € 55,700 has been allocated for research activities under the responsibility of IMC-CNR.

Project partners: Meccanica Finnord S.p.A. (Leader), MCM Machining Centers Manufacturing S.p.A., Consorzio CETMA - Centro di Progettazione, Design e Tecnologie dei Materiali, ATS Marche Sustainable Manufacturing (consisting of Elica S.p.A., Itaca s.n.c. di Malvatani Emanuele e C., AEA Gruppo Loccioni S.p.A., Nuova Simonelli S.p.A., Picenum Plast S.p.A., Profilglass S.p.A., Eurosuole S.p.A., Zannini S.p.A.), ATS SustainableManufacturing (constituted by Losma S.p.A., LOT Quantun Design formerly L.O.T. Oriel Italia srl, BLM S.p.A., ADIGE S.p.A., ADIGE-SYS S.p.A., ST Protect S.p.A., Pulverit S.p.A., Icap Sira S.p.A., Benasedo S.p.A., Franchi & Kim S.p.A., Printgraph S.p.A., Sapici S.p.A.), ITIA-CNR, ISSIA-CNR, IFN-CNR, ITC-CNR, ISMAC-CNR, IMCB-CNR, ICTP-CNR, IMC-CNR, ICCOM-CNR, ISTECC-CNR, Politecnico di Milano, Università Politecnica delle Marche.

Partners involved in Activity 3.4.3: IMC-CNR, IGAG-CNR, ISTECC-CNR.

Dates

December 2015 – November 2016

Occupation or position held

As a researcher at IMC-CNR, he has been **scientific collaborator of the Regional Project FILAS-Lazio "ITER"**, coordinated by IMC-CNR, aimed at promoting joint R&D project initiatives between CNR and companies active in the agri-food and conservation of Cultural Heritage sectors.

Main activities and responsibilities

- Contribution to the conception, development and presentation of the project proposal.
- Dissemination and promotion within the regional territory of the technologies and skills

	<p>gained by IMC-CNR and, more in general, by the institutes of the CNR Research Area of Rome 1 in the agri-food and conservation of Cultural Heritage sectors.</p> <ul style="list-style-type: none"> • Activities of facilitator and technical-scientific consultant for the finalization of memoranda of understanding and joint project activities between CNR and Lazio companies operating in the two sectors that the ITER project had the aim to enhance. • Training and operational technical-scientific support to local subjects for the conception, development and presentation of research and development project proposals in the areas of valorization of agri-food products and Cultural Heritage. • Critical analysis and presentation of the results obtained in a dedicated technical report and in oral presentations carried out during dissemination events foreseen in the project itself.
<p>Name and address of employer</p> <p>Type of business or sector</p>	<p>Institute of Chemical Methodologies of CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, Italy.</p> <p>Activities as facilitator and technical-scientific consultant for local companies operating in the agri-food sector and in the conservation of Cultural Heritage.</p> <p>Full name of the project: "ITER – <i>Impresa Territorio Ricerca</i>".</p> <p>Program and call: National Program "FILAS Lazio", call 2014.</p> <p>Project duration: two years.</p> <p>Project funding: total funding of € 162,932, entirely allocated to IMC-CNR as the sole beneficiary of the project.</p> <p>Project partner: IMC-CNR (Leading Partner and sole beneficiary of the project).</p>
<p>Dates</p> <p>Occupation or position held</p>	<p>May 2015 – November 2015</p> <p>As a researcher at IMC-CNR, he has been Scientific Director of the IMC-CNR Project Operational Unit involved in the CNR "AQUA" Premiale National Project, coordinated by DISBA-CNR and aimed at developing new green & <i>circular</i> materials and technologies that can be used to counteract desertification processes and enhance the sustainable use of water resources in the agricultural sector.</p>
<p>Main activities and responsibilities</p>	<ul style="list-style-type: none"> • Conception, development and presentation of the technical-scientific contents related to the research activities of IMC-CNR included in the project proposal. • Design and development of new eco-efficient soil improver mixtures, based on zeolitic matrix aluminosilicate rocks and able to increase the water retention capacity of sandy or arid soils as well as activate the pedogenetic process in desert areas, by exploiting the characteristics of cation exchange, water adsorption and the properties of molecular sieving typical of zeolites. • Experimentation on highly draining sandy soils, both untreated and amended with the developed and mixtures, in which selected plant species of agri-food interest have been planted and grown in dry conditions. Measurement of water retention of amended and untreated soils, measurement of ecophysiological parameters, foliar chemistry and productivity of vegetable species grown in the different substrates. • Critical <i>ex-post</i> analysis and presentation of the results obtained to the work package leader and the project manager.
<p>Name and address of employer</p> <p>Type of business or sector</p>	<p>Institute of Chemical Methodologies of CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, Italy.</p> <p>CNR research activities in the field of new materials and sustainable processes for water saving in the agri-food sector, adaptation to climate change and contrast to desertification.</p> <p>Full name of the project: "AQUA - <i>Gestione sostenibile della risorsa acqua in agricoltura</i>"</p> <p>Program and call: National CNR Program "Premiale", call 2014, funded by MIUR.</p> <p>Duration of the project: the activity of the IMC-CNR Project Operational Unit lasted one year and was carried out within the Task 3.5 "Nuovi Materiali" of the Work Package 3 "Miglioramento della resistenza alla siccità e miglioramento della WUE" of the project.</p> <p>Project funding: total funding of € 2,013,474, of which a quota of € 45,000 has been allocated for the research activities under the responsibility of IMC-CNR.</p> <p>Project partners: DISBA-CNR (Leading Partner), IMC-CNR, IVALSA-CNR, IBBA-CNR, ISA-CNR, IBIMET-CNR, IPSP-CNR, ISAFoM-CNR, ISPAAM-CNR, IRPPS-CNR, IPCB-CNR, IBBR-CNR.</p>

Partners involved in Task 3.5: IVALSA-CNR, IMC-CNR, IPCB-CNR, IBBR-CNR.

Dates	November 2014 – February 2015
Occupation or position held	Contract Scientific Consultant for the identification of natural rocks with catalytic properties in the photolytic degradation of VOCs , to be used in indoor filtration systems.
Main activities and responsibilities	Preliminary analysis, identification and definition of the potential offered by natural stone materials to be used as catalysts in the photocatalytic degradation of volatile organic compounds (VOCs), in order to be used in conjunction with high filtration systems based on the <i>Corona Discharge</i> phenomenon developed by SEMA S.r.l..
Name and address of employer	SEMA S.r.l., Via della Genetica, 17, Rieti, Italy.
Type of business or sector	Technical-scientific advice for the development of new materials and technologies for the abatement of volatile organic contaminants (VOC) in indoor environments.
Dates	December 2013 – February 2015
Occupation and position held	As a researcher at IMC-CNR, he carried out joint research activities with IBAF-CNR on the development of new green technologies , in the form of biocatalysts for the removal of pollutants in contaminated water , obtained by immobilizing the laccase enzyme on natural rocks with zeolitic matrix.
Main activities and responsibilities	Selection and determination of the chemical and physical characteristics of the natural zeolitic matrices most suitable to be used as a support for the production of the biocatalysts.
Name and address of employer	Institute of Chemical Methodologies of CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, Italy.
Type of business or sector	CNR application research activity in the field of new materials and green technologies for the abatement of pollutants in water.
Dates	December 2012 – October 2016
Occupation or position held	As a researcher at IMC-CNR, he was Scientific Director of the IMC-CNR Project Operational Unit and Work Package Leader of Work Package 1 and 5 for the CNR National Flagship Project "Factory of the Future" "MECAGEOPOLY" , coordinated by IMC-CNR and aimed at developing new <i>green & circular</i> products and processes for the decarbonisation of the cement production sector.
Main activities and responsibilities	<ul style="list-style-type: none">• Conception, development and presentation of the technical-scientific contents related to the research activities of CNR-IMC included in the project proposal.• Chemical activation of selected aluminosilicate rocks and determination of their reactivity to alkaline attack by means of XRPD, FT-IR, TGA-DTG-DTA analyses and ¹H, ¹⁹Si and ²⁷Al MAS NMR solid-state spectroscopy.• Formulation and synthesis of new inorganic geopolymeric binders with reduced CO₂ emissions, produced starting from mechano-chemically activated aluminosilicate rocks.• Testing of geopolymer binders through the production of environmentally friendly mortars and artificial rocks that can be applied in the construction, environmental engineering and restoration of Cultural Heritage sectors.• Critical <i>ex-post</i> analysis and presentation of the results obtained in the <i>ad-interim</i> and final reports of the project.
Name and address of employer	Institute of Chemical Methodologies of CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, Italy.
Type of business or sector	Development of new geopolymer-based cementitious materials for the decarbonization of industrial emissions in cement production through mechano-chemical processes. Promotion of circular economy models in the cement sector. Full name of the project: "MECAGEOPOLY - Mechano-chemistry: an innovative process in the industrial production of poly-sialate and poly-silanoxosialate geopolymeric binders used in building construction" Program and call: CNR National Program "Flagship Project", call "Factory of the Future".

	<p>Project duration: two years.</p> <p>Project funding: total funding of € 618,468, of which a quota of € 104,061 has been allocated for research activities under the responsibility of IMC-CNR.</p> <p>Project partners: IMC-CNR (Leading Partner), ISTECC-CNR, IGAG-CNR, ISM-CNR.</p>
Dates	September 2012 – March 2013
Occupation or position held	Recruited at IMC-CNR with a contract as a Level III Researcher , with public selection Prot. N.0000338 of 27/08/2012 designed to select personnel with proven skills in the fields of characterization and treatment of aluminosilicic rocks, both pozzolanic and glassy matrix, as well as different types of secondary raw materials for the development of new environmentally friendly materials and for environmental sanitation applications.
Main activities and responsibilities	<ul style="list-style-type: none"> • Research activities consistent with the mission of the Institute and its CNR Department of affiliation, carried out mainly on funds acquired through projects conceived, developed and submitted to national and European programs. Consequent scientific production, in the form of publications in ISI journals, non-ISI journals, books, book chapters, technical-scientific reports and conference proceedings with ISBN (CNR First Mission). • Technology transfer of research results, carried out by means of memoranda of understanding signed with private companies and public-private technological clusters (CNR Second Mission). • Higher education on research topics, carried out through dedicated European projects, recognized training courses in the academic field, university teachings, advisor, co-advisor and tutor of undergraduates/PhD students (CNR Third Mission).
Name and address of employer	Institute of Chemical Methodologies of the CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, commissioned by Aero Sekur S.p.A., Via delle Valli 46, Aprilia, Latina, Italy.
Type of business or sector	Research, technology transfer and higher education activities, in accordance with the mission of the Institute and its CNR department of affiliation.
Dates	August 2011 - April 2012
Occupation or position held	As a research fellow at IMC-CNR, he was a scientific collaborator for the research carried out by the Institute at the Colleferro landfill site , as part of an assignment aimed at identifying the possible contamination of aquifers due to infiltration of leachate produced by waste materials present the landfill.
Main activities and responsibilities	<ul style="list-style-type: none"> • Modelling of the groundwater flow in the investigated sector of the Municipality of Colleferro and production of scenarios for the transport of pollutants into the groundwater coming from contaminant sources located in the territory. • Correlation between rainfall intensity recorded at the site, infiltration of leaching water into the landfill body and concentrations of pollutants detected in groundwater. • Determination of a possible landfill leachate pretreatment system based on the use of natural zeolites for the abatement of both BOD and COD.
Name and address of employer	Institute of Chemical Methodologies of the CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, commissioned by Consorzio Gaia S.p.A., Via Carpinetana Sud, 144 00034, Colleferro, Rome.
Type of business or sector	CNR research activities in the field of new materials and sustainable technologies aimed at tracking and abating pollutants in water.
Dates	May 2011 - May 2012
Occupation or position held	Hired at IMC-CNR with a 12-month contract as Research Fellow with public selection Prot. N.0000238 of 17/05/2011 aimed at selecting personnel able to carry out research activities on zeolitic rock materials in the framework of the Regional Project "ZEOTEX" , funded by the Lazio Region through FILAS call. The aim of the project was to use natural zeolitic rock materials for the production of novel organic-inorganic hybrid tissues with adsorbent properties.
Main activities and responsibilities	<ul style="list-style-type: none"> • Selection and sampling of Lazio volcanic tuffs exhibiting high content of zeolites,

	<p>determination of the content and type of zeolitic minerals present in these materials by means of TGA-DTA-DTG, XRPD-RIR analyses, determination of cation exchange capacity (CEC) and ^1H, ^{19}Si and ^{27}Al MAS NMR solid state spectroscopy.</p> <ul style="list-style-type: none"> • Development of apparatuses for the physical absorption of micronized tuff particles on fabrics suitable for the preparation of organic-inorganic hybrid materials, to be used for the filtration of airborne contaminants in indoor environments. • Critical <i>ex-post</i> analysis of the results obtained, contribution to the <i>ad-interim</i> and final reports of the project.
Name and address of employer	Institute of Chemical Methodologies of CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome.
Type of business or sector	CNR research activities in the field of new materials and sustainable technologies for the abatement of airborne contaminants in indoor environments.
Dates	December 2008 – January 2009
Occupation or position held	Contract Scientific Consultant of IMC-CNR for for the sampling of Peperino Tipico Viterbese and the evaluation of geological parameters, of quarry processes, of processing residues in the quarries of Vitorchiano (Viterbo, Lazio). The aim was to establish the presence of copper in quarry wastewater.
Main activities and responsibilities	<ul style="list-style-type: none"> • Acquisition of geological information on the glassy matrix ignimbrite named Peperino Tipico Viterbese and estimation of its natural copper content, based on the knowledge on Lazio volcanism, the genesis of the volcanic product, contamination during extraction and processing, and possible enrichment caused by agents that are external to the quarry and its processes (i.e. pollution given by percolating water, fertilizers). • Collection of samples of intact and processed material in the quarries identified in the contract. • Contribution to the drafting of the final technical report.
Name and address of employer	Institute of Chemical Methodologies of CNR, Research Area Roma 1, Via Salaria Km 29,300, 00015, Monterotondo, Rome, Italy.
Type of business or sector	Technical-scientific advice for the evaluation of environmental parameters associated with quarry mining activities.
Dates	February 2004
Occupation or position held	Trainer for the University Training and Orientation Internship on environmental issues , for students of the fourth year of the Interfaculty Degree Course in Communication Sciences of the University of Perugia.
Main activities and responsibilities	Lectures on the Italian best practices and polices regarding waste disposal, protection of inland waters, quarry and mining activities, protection of cultural and natural heritage.
Name and address of employer	University of Perugia, Piazza dell'Università 1, Perugia and Legambiente Umbria, Via della Viola 1, Perugia, with reference to Convention No. 71 between the Faculty of Humanities and Legambiente Umbria.
Type of business or sector	Training on environmental sustainability and protection of Cultural Heritage.
Dates	June 2000 - April 2001
Occupation or position held	Impiegato at Legambiente Umbria.
Main activities and responsibilities	Representative of Legambiente Umbria for Environmental and Territorial Policies , with participation to the meetings of the Regional Commission for the definition of the PRAE (Regional Plan for Mining Activities).
Name and address of employer	Legambiente Umbria, Via della Viola 1, Perugia, Italy.
Type of business or sector	Representative of Legambiente for the Environmental and Territorial Policies of the Umbria Region, as part of the Substitute Civil Service in fulfillment of the obligations of Italian Military Service.

Education and training

Dates	October 2015
Title of qualification awarded	Advanced Training and Professional Updating Course: " <i>Use of SSAP (Slope Stability Analysis Program). Calculation program for the analysis of slope stability</i> " (valid for the Continuous Professional Updating required by the Professional Order of Geologists, with recognition of 32 Professional Training Credits if the final written test was passed).
Principal subjects/occupational skills covered	Advanced theoretical and practical training on slope stability verification techniques by means of Advanced Boundary Equilibrium Methods (ALEM) and by using the SSAP semi-finite element mathematical model. Application of SSAP in fractured rock masses and soft rocks, by following the Hoek et al. criterion 2002, 2006. Insertion of rock reinforcements (pilings, tie rods, reinforced earth, geogrids, retaining walls) and consequent stability checks. Use of SSAP under the Italian NTC2018 standard. Application of SSAP to real cases and comparison of results obtained by different stability verification methods.
Name and type of organization providing education and training	Order of Geologists of the Umbria Region, Via Martiri dei Lager 58, Perugia, Italy.
Dates	October 2010
Title of qualification awarded	European Postgraduate Course of Higher Education: " <i>Doctoral Course on Management and protection of cultural heritage facing climate change</i> ".
Principal subjects/occupational skills covered	Higher education on advanced methodologies for assessing the impacts of climate change on the structural characteristics and materials of Cultural and Natural Heritage. Training on the state-of-the-art technologies and approaches aimed at increasing the resilience of Cultural and Natural Heritage towards the effects produced by natural events that are exacerbated by climate change (i.e. floods, more severe temperature fluctuations). Training on the most advanced protocols and regulations for the conservation of museum assets, presented by the managers of structures of international relevance, such as the Louvre and the British Museum.
Name and type of organization providing education and training	European University Centre for Cultural Heritage (CUEBC), Ravello, Italy.
Dates	September 2009
Title of qualification awarded	Advanced Training and Professional Updating Course: " <i>Slope stability: Theoretical and practical aspects</i> " (valid for the Continuous Professional Updating required by the Professional Order of Geologists, with recognition of 35 Professional Training Credits).
Principal subjects/occupational skills covered	Advanced theoretical and practical training on the evaluation of the stability of rock and soil slopes, carried out through mathematical models based, respectively, on the Stability Criteria of the Rock Slopes of Hoek & Bray and Hoek & Brown and on the Global Limit Balance Analysis Methods of Bishop, Bishop Simplified, Fellenius, Jambu, Morgenstern-Price and Spencer. Training in the use of the CLARA mathematical model for the evaluation of the stability of slopes in loose rock by means of safety factor.
Name and type of organization providing education and training	CERI Research Center on Forecasting, Prevention and Control of Geological Risks of La Sapienza University of Rome, Valmontone, Italy.
Dates	September 2009
Title of qualification awarded	Advanced Training and Professional Updating Course: " <i>Local seismic response according to the new legislation: classification criteria, hazard and microzonation with numerical processing</i> " (valid for the Continuous Professional Updating required by the Professional Order of Geologists, with recognition of 44 Professional Training Credits).
Principal subjects/occupational skills covered	Advanced theoretical and practical training on local seismic response, through lectures and

<p>skills covered</p> <p>Name and type of organization providing education and training</p>	<p>exercises on the following topics: principles of seismology and instrumental analysis; determination of parameters of dynamic behavior of soils from on-site and laboratory tests; geological model of the subsoil in local seismic response studies; seismic reliability and territory classification; methods and calculation codes for seismic hazard analysis; geophysics applied to local seismic response surveys (seismic methods, Rayleigh waves, SASW and geophysical data processing); quantitative methods for the evaluation of local seismic amplification and analysis on real cases; examples of seismic microzonation, levels of detail, databases and methodologies for the elaboration of seismic microzonation maps; seismic microzonation and urban planning tools.</p> <p>CERI Research Center on Forecasting, Prevention and Control of Geological Risks of La Sapienza University of Rome, Valmontone, Italy.</p>
<p>Dates</p> <p>Title of qualification awarded</p> <p>Principal subjects/occupational skills covered</p>	<p>February 2009</p> <p>Achievement of the PhD in Earth Sciences and Geotechnology, with discussion of a Thesis aimed at developing a new integrated approach for the diagnosis of structural damage and physical, chemical and mechanical alteration of archaeological heritage located in rural contexts, with particular reference to the conservation of monumental rocky cultural assets that are placed in complex geomorphological systems, such as steep ravine geosites.</p> <p>Chemical, physical and mechanical characterization of stone materials (with particular reference to Lazio ignimbrites with both zeolitic and vitritic matrix) used in Cultural Heritage and analysis of the factors responsible for their surface alterations and structural damage. Three-year experimental thesis, with attendance to the Seminars for PhD students organized by the Department of Earth Sciences of the University of Perugia.</p>
<p>Name and type of organization providing education and training</p>	<p>University of Perugia, Department of Earth Sciences, Piazza dell'Università 1, Perugia.</p> <p>Coordinator of the PhD Cycle: Prof. Gianpiero Poli, Tutor: Prof. Carlo Cattuto (Department of Earth Sciences, University of Perugia).</p> <p>National Evaluation Commission: President: Prof. Corrado Cencetti (Earth Sciences, University of Perugia); Members: Prof. Gilberto Pambianchi (Earth Sciences, University of Camerino) and Prof. Gabriele Scarascia Mugnozza (Earth Sciences, University of Rome, La Sapienza).</p>
<p>Dates</p> <p>Title of qualification awarded</p> <p>Principal subjects/occupational skills covered</p>	<p>July 2008</p> <p>International Advanced Training Course: "<i>GIS Terrain Analysis for Hydrogeomorphic Applications</i>".</p> <p>Advanced theoretical and practical training on state-of-the-art GIS hydrological and geomorphological models for digital analysis of the territory aimed at hydrogeological applications, study of slopes at risk of landslide and climate change adaptation strategies. Introduction to the hydromorphological models contained in the ESRI ArcGIS digital suite, to the Copula function and to the use of statistical analysis packages (such as S-plus and R) aimed at performing hydrogeological simulations, with particular emphasis placed on extreme events that deviate from average climate trends. Development and presentation, at the end of the course, of an original project, produced by using the ArcGIS models tested.</p>
<p>Name and type of organization providing education and training</p>	<p>University of Tuscia, Viterbo, Italy, in collaboration with Polytechnic Institute of New York University, New York, USA.</p> <p>Honoris Center of Italian Universities-H2CU, Interuniversity Center for International Education.</p>
<p>Dates</p> <p>Title of qualification awarded</p> <p>Principal subjects/occupational skills covered</p> <p>Name and type of organization providing education and training</p>	<p>February 2006</p> <p>Admission to the XXI Cycle of the PhD Course in Earth Sciences and Geotechnology obtained by passing the written and oral tests of the national competition for 6 PhD positions, announced by the University of Perugia and open to all graduates in Geology, Engineering and Natural Sciences.</p> <p>PhD Course in Applied Geology, Hydrogeology, Environmental Geology and Geoengineering.</p> <p>University of Perugia, Board of Teachers of Degree Courses in Earth Sciences and Engineering.</p>

Dates

January 2006

Title of qualification awarded**Qualification to practice the profession of Geologist and consequent registration in the Professional Register of the Order of Geologists****Principal subjects/occupational skills covered**

Qualification to practice the profession of Geologist obtained by passing the tests required by the regulations. Consequent registration in the National Register of Geologists and in the Regional Order of Geologists of the Umbria Region, where he is still regularly registered:
<http://www.ordinegeologiumbria.it/index.php/it/albo/looking/ciccioli-piero-461>

Name and type of organization providing education and training

Order of Geologists of the Umbria Region, Via Martiri dei Lager 58, Perugia, Italy.

Dates

July 2005

Title of qualification awarded**Master's Degree in Geological Sciences, Applied Geology and Geotechnology, with a score of 109/110****Principal subjects/occupational skills covered**

Experimental thesis concerning the identification of the Lazio ignimbrites (belonging to both Vicano and Vulsino Volcanic Districts) used for the construction of the rock-cut tombs of the Etruscan necropolis of Norchia (Viterbo, Lazio) and evaluation of the damage processes produced by anthropic and natural agents on these monumental structures.

Name and type of organization providing education and training

University of Perugia, Department of Earth Sciences, Piazza dell'Università 1, Perugia, Italy.

Language skills**Native language**

Italian

Other languages**Self-assessment****English**

Understanding				Speaking				Writing	
Listening		Reading		Spoken Interaction		Spoken production			
C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user

Research skills, competences and interests

All the different skills developed over the years by Dr. Piero Ciccioli converge towards the development of new materials and enabling technologies aimed at improving environmental sustainability in the sectors of agriculture, *high-carbon industries* and conservation of Cultural and Natural Heritage.

The main area of expertise of Dr. Piero Ciccioli is the the determination of the physical, chemical and mechanical properties of natural stone materials (in particular aluminosilicic volcanic rocks, having both vitritic and zeolitic matrix) and secondary raw materials (especially fly ashes and artificial pozzolans) that can be applied in different sectors of sustainable development.

In this regard, he has gained proven technical-scientific experience in:

- Combined application of the following analytical techniques
 X-ray powder diffractometry (XRPD);
 X-ray fluorescence (XRF);
 Scanning electron microscopy (SEM);
 Fourier transform infrared spectroscopy (FT-IR);
 Thermogravimetric analysis (TGA-DTA-DTG);
 Electron microprobe (EPMA);

Mercury porosimetry;

in order to determine the changes in the mineralogical, petrographic, chemical, physical, mechanical and mechano-chemical characteristics of natural stone materials and secondary raw materials that can be induced by the impacts of environmental agents (*weathering processes*) and industrial processes (e.g. grinding, heat treatments).

- Interpretation of solid state ^1H , ^{19}Si and ^{27}Al MAS NMR spectroscopic data to determine variations in pozzolanic activity that may occur in natural stone materials and secondary raw materials when subjected to heat and mechanical treatments.
- Combined application of the following analytical techniques:
X-ray powder diffractometry with internal standard (XRPD-RIR);
Thermogravimetric analysis (TGA-DTA-DTG);
Determination of cation exchange capacity (CEC);
in order to quantitatively evaluate the fraction contained in natural rocks of minerals (especially zeolites) that exhibit remarkable properties of water vapor adsorption, absorption of liquid water and cation exchange capacity.
- Development and application of experimental protocols that combine determination of foliar gas exchanges made by using Li-Cor (measurement of photosynthetic activity, stomatal conductance, transpiration, chlorophyll fluorescence), biometric surveys, evaluations of biomass produced, analysis of the concentration of elements in leaf biomass by means of ICP-MS and CHNS-O elemental analysis carried out on samples of plant species of food interest developed on technosols with different composition and variable water content. All this in order to evaluate the suitability and effectiveness of different technosols in the field of soilless agricultural production and in conditions of water stress.

Through his research activities, Dr. Ciccioni has applied the aforementioned knowledge to develop new eco-sustainable products and processes. The main objectives achieved in this regard are the following:

- Formulation and synthesis of new cements and polymers with low CO_2 emissions that can be applied in the construction sector;
- Formulation and synthesis of artificial rocks that can be applied in the field of restoration and structural consolidation of monuments and architectural heritage of cultural interest;
- Development of mechano-chemical treatments of secondary raw materials to improve energy efficiency and promote the decarbonization of the cementitious binder production sector;
- Development of new natural soil conditioners to improve the water efficiency of arid and/or drought-prone soils;
- Formulation and synthesis of non-toxic geopolymeric resins for bonding wooden materials used in the wood and furniture industry;
- Development of new technologies and materials for the removal of toxic contaminants in *indoor* aerial environments and wastewater;
- Development of eco-sustainable substrates for soilless and greenhouse cultivation of plant species of food interest.

Starting from 2019, the year in which he joined the Department of Biology, Agriculture and Food Sciences of the CNR, he applied his previous knowledge of geographic information systems (GIS) to the modelling of emissions of volatile organic compounds (VOCs), both of anthropogenic and biogenic (BVOC) origin, and has started to acquire skills on detection techniques for measuring the concentrations of these compounds and other airborne substances (especially contaminants, such as formaldehyde and NO_2) in indoor and outdoor environments.

Dr. Piero Ciccioni also has a solid geotechnical and hydrogeological background, with specific skills in:

- Analysis of stability of rock slopes through different mathematical models based on the criteria of Hoek & Bray and Hoek & Brown, in particular:
Dips for the statistical contouring of fractured rock deposits and for the illumination of kinematic and dynamic compatibility fields;
SWedge for the evaluation of geometry and stability of rock wedges;
RocPlane for the evaluation of the stability of rock masses with planar sliding surfaces;
RockFall for the two-dimensional study of the runout of boulders collapsing from rock slopes.
- Analysis of stability of land slopes through different mathematical models based on the

approaches of Bishop, Fellenius, Jambu, Morgenstern-Price and Spencer, with particular referenceto:

Slide2 for the two-dimensional analysis of the stability of circular and non-circular surfaces in loose rock slopes;

SSAP for the evaluation of the stability of slopes in soil and rock through modelling of 'quasi-finite' elements ("quasi-finite element analysis");

DAN (software developed by Oldrich Hungr, open source) for the three-dimensional evaluation of landslide runout.

- Production of hydrogeological and landslide risk scenarios through dedicated statistical algorithms, developed in ArcGIS and QGIS suites.

Finally, Dr. Piero Ciccioni has a proven state-of-the-art knowledge of technologies, production approaches and national, EU and international policies aimed at improving environmental sustainability and promoting sustainable development, such as:

- *Circular Economy* models;
- *Green Economy* models;
- *Low-carbon Economy* models;
- *Blue Economy* models;
- Models of preservation of water resources;
- Bioeconomy models;
- Economic-environmental ("*viable*"), socio-economic ("*equitable*") and socio-environmental ("*bearable*") approaches useful for achieving the 17 Sustainable Development Goals envisaged by the UN 2030 Agenda for Sustainable Development.

Driving Licence

Driving licence B

ISI scientific publications and peer reviewed book chapters with ISBN

Ciccioni P., Silibello C.*, Finardi S., Pepe N., Ciccioni P., Rapparini F., Neri L., Fares S., Brilli F., Mircea M., Magliulo E., Baraldi R. (2023)

The potential impact of biogenic volatile organic compounds (BVOCs) from terrestrial vegetation on a Mediterranean area using two different emission models

Agricultural and Forest Meteorology, Volume 328, 15 January 2023, 109255, ISSN: 0168-1923

DOI: <https://doi.org/10.1016/j.agrformet.2022.109255>

SJR classification index: Q1 in Agronomy and Crop Science; **Q1** in Atmospheric Science; **Q1** in Forestry; **Q1** in Global and Planetary Change

Impact Factor 2022 = 6.424

Manco A.*, Ciccioni P., Famulari D., Brilli F., Ciccioni P., Di Tommasi P., Toscano P., Gioli B., Esposito A., Magliulo V. (2022)

Real-time air concentrations and turbulent fluxes of volatile organic compounds (VOCs) over historic closed landfills to assess their potential environmental impact

Environmental Pollution, Volume 309, 15 September 2022, 119748, ISSN: 0269-7491

DOI: <https://doi.org/10.1016/j.envpol.2022.119748>

SJR classification index: Q1 in Health, Toxicology and Mutagenesis; **Q1** in Medicine (miscellaneous); **Q1** in Pollution; **Q1** in Toxicology

Impact Factor 2022 = 9.988

Ciccioni P., Pallozzi E., Guerriero E., Iannelli M.A., Donati E., Lilla L., Rinaldi C., Svaldi P., Ciccioni P.*, Mabilia, R. (2022)

A New Testing Facility to Investigate the Removal Processes of Indoor Air Contaminants with Different Cleaning Technologies and to Better Assess and Exploit Their Performances

Environments MDPI, Vol. 9(1), 3, ISSN: 2076-3298

DOI: <https://doi.org/10.3390/environments9010003>

Piero Ciccioni

SJR classification index: Q2 in Ecology, Evolution, Behavior and Systematics; Q2 in Environmental Science (miscellaneous); Q2 in Renewable Energy, Sustainability and the Environment

Impact Factor 2022 = 3.714

Cavallo D.*, Fresegna A.M., Ciervo A., Ursini C.L., Maiello R., Del Frate V., Ferrante R., Mabilia R., Pizzo B., Grossi B., Ciccioli P., **Ciccioli P.**, Iavicoli S. (2022)

New formaldehyde-free adhesives for wood manufacturing: In vitro evaluation of potential toxicity of fine dust collected during wood sawing using a new experimental model to simulate occupational inhalation exposure.

Toxicology, Volume 466, January 30, 2022, 153085, ISSN: 0300-483X

doi: 10.1016/j.tox.2021.153085

SJR Classification Index: Q2 in Toxicology

Impact Factor 2022 = 4.221

Ciccioli P. *, Capitani D., Gualtieri S., Soragni E., Belardi G., Plescia P., Contini G. (2019)
Mechano-Chemistry of Rock Materials for the Industrial Production of New Geopolymeric Cements

In: Tolio T., Copani G., Terkaj W. (Eds.) "Factories of the Future - The Italian Flagship Initiative". Springer Nature Switzerland AG, Basel, Switzerland, pp. 383-407.

ISBN: 978-3-319-94357-2

Captains D.*, **Ciccioli P.**, by Tullio V., Proietti N. (2018)

High-Resolution Solid-State NMR of Cultural Inorganic Materials

In: Webb G. (Ed.) "Modern Magnetic Resonance" (Second Edition) Springer International Publishing AG, Cham, Switzerland, pp. 255-291.

ISBN: 978-3-319-28387-6

Ciccioli P. (2016)

Caratterizzazione geologica del Sito (di Norchia)

In: Norchia II, Le Necropoli Rupestri dell'Etruria Meridionale 3, di Laura Ambrosini (Ed.), CNR Edizioni, Roma, pp. 60-70 del "Tomo Testo" e 4 Tavole del "Tomo Tavole".

ISBN: 978-88-8080-220-4

Donati E., Polcaro M.C., **Ciccioli P.**, Galli E.* (2015)

The comparative study of a laccase-natural clinoptilolite-based catalyst activity and free laccase activity on model compounds

Journal of Hazardous Materials, Volume 289, 30 May 2015, pp. 83-90, ISSN: 0304-3894

DOI: <http://dx.doi.org/10.1016/j.jhazmat.2015.02.048>

SJR classification index: Q1 in Environmental Chemistry; Q1 in Environmental Engineering, Q1 in Health, Toxicology and Mutagenesis; Q1 in Pollution; Q1 in Waste Management and Disposal

Impact Factor 2022 = 14.224

Ciccioli P., Plescia P., Capitani D.* (2010)

¹H, ²⁹Si, and ²⁷Al MAS NMR as a tool to characterize volcanic tuffs and assess their suitability for industrial applications

The Journal of Physical Chemistry C, 2010, Volume 114, Issue 20, pp. 9328-9343, ISSN: 1932-7447, 1932-7455

DOI: <https://pubs.acs.org/doi/abs/10.1021/jp103082h>

SJR classification index: Q1 in Electronic, Optical and Magnetic Materials; Q1 in Energy (miscellaneous); Q1 in Nanoscience and Nanotechnology; Q1 in Physical and Theoretical Chemistry; Q1 in Surfaces, Coatings and Films

Impact Factor 2022 = 4.126

Ciccioli P.*, Cattuto C., Plescia P., Valentini V., Riccardo N. (2010)

Geochemical and engineering geological properties of the volcanic tuffs used in the Etruscan tombs of Nochia (Northern Latium, Italy) and factors responsible for their fast surface and structural decay

Archaeometry, Volume 52, Issue 2, April 2010, pp. 229-251, ISSN: 0003-813X

DOI: <https://doi.org/10.1111/j.1475-4754.2009.00464.x>

SJR Classification Index: Q1 in Archaeology, Q1 in History
Impact Factor 2022 = 1.519

Curatorship of books with ISBN

Ciccioli P., Ragni P. (Eds.) (2022)
CHERISH: A European Project for the Valorization of Cultural and Natural Heritage
Valmar Editore, Rome, Italy
ISBN: 978-88-97987-25-3.

Ciccioli P., Ragni P. (Eds.) (2018).
EnVet - Environment in the VET System: a powerful tool for the future
Valmar Editore, Rome, Italy
ISBN: 978-88-97987-20-8.

**Non-ISI scientific publications
and publications in conference
proceedings with ISBN**

Silibello C*, Finardi S., Pepe N., Baraldi R., **Ciccioli P.**, Mircea M., Ciccioli P. (2023)
Modelling of Biogenic Volatile Organic Compounds Emissions Using a Detailed Vegetation Inventory Over a Southern Italy Region
In: Mensink, C., Jorba, O. (eds) Air Pollution Modeling and its Application XXVIII. ITM 2021. Springer Proceedings in Complexity. Springer, Cham, Germany, pp. 279-285
ISBN: 978-3-031-12785-4

Ciccioli P.*, Coratella R., D'Esposito F., Ragni P. (2022)
Results of the activities performed with VET students/learners and aimed at testing the products of the Erasmus+ transnational education project "CHERISH - Cultural and natural HERitage: a Sustainable tourism VET integrated Approach"
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Palma de Majorca, Spain, July 5th and 6th 2021, pp. 1900-1910, ISSN: 2340-1117
ISBN: 978-84-09-31267-2

Ciccioli P.*, Ambrosini L., Gualtieri S. (2019)
The weathering processes of the volcanic tuffs used in the Etruscan tombs of Norchia necropolis (Northern Latium, Italy), microclimatic conditions influencing their surface and structural decay, possible new materials aimed at their conservation
In: "Technologies for the Recovery of Built. Humidity in construction: diagnosis and methods of intervention. From Mechanical Cutting to Charge Neutralization Technique"
Matera, Italy, April 4 th & 5th 2019, pp. 141-149
ISBN: 978-88-6026-270-7

Ciccioli Pi.*, Lilla L., Pizzo B., Grossi B., Gualtieri S., Ciccioli Pa., Mabilia R. (2018)
Replacing formaldehyde resin in wood industry with new adhesives based on Si-Al geopolymers: the FREEFORES Project

In: "Proceedings of the 3rd European Symposium on Surface Science"
Nice, France, October 17th-19th 2108, p.18
ISBN: 978-88-943897-0-8

Ragni P.*, **Ciccioli P.** (2018)

Environment in the VET system: a powerful tool for the future (EN-VET)

In: Proceedings of "EDULEARN18 – 10th International Conference on Education and New Learning Technologies"

Palma de Majorca, Spain, July 2nd-4th 2018, pp. 702-712, ISSN: 2340-1117

ISBN: 978-84-09-02709-5

Orlandi G*., Mazzei M., **Ciccioli P.**, Di Salvo C., Bangrazi A. (2017)

Alla Scoperta dell'ingegneria idraulica romana del II sec.a.C.: I prata di Corchiano (VT) lungo il fosso di Fustignano

Geologia dell'Ambiente, Supplemento al N. 3/2017, pp. 220-225, ISSN: 1591-5352

Ciccioli P. (2017)

Mechanochemical activation of natural kaolins: a sustainable, low carbon, process for the synthesis of geopolymeric cements

In: "Proceedings of the Conference of the Department of Chemical Sciences and Materials Technologies"

Alghero, Italy, October 19th-20th 2017, pp. 19-20

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Plescia P*., Tempesta E., Di Stefano A., **Ciccioli P.** (2016)

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Crete, Greece, September 27th -30th 2016

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Ambrosini L*., **Ciccioli P.**, Genovese L. (2015)

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Gioia del Colle, Italy, October 21th-22th 2014, pp. 191-206

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Ciccioli P.*, Capitani D., Plescia P. (2009)

Factors responsible for the fast surface and structural decay of the rock-cut tombs of the Etruscan necropolis of Norchia (Northern Latium, Italy) and possible strategies for their conservation.

In: A. Ferrari (Ed.) "Proceedings of the 4th International Congress on Science and Technology for the Safeguard of Cultural Heritage of the Mediterranean Basin – Volume II".

Cairo, Egypt, December 6th-8th 2009, pp. 164-169

ISBN: 978-88-96680-32-2

Altieri R., Esposito A., **Ciccioli P.**, Stanzione V., Poriotti N., Lilla L., Trapasso F. (2021)

Analysis of Chemical-physical and Biological Properties of the Final Growing Media

38-page *ad-interim* scientific report on the activities performed by ISAFoM-CNR in the framework of the "SUSMEDHOUSE" project and aimed at creating sustainable 'soilless growth media'. The report presents the results of the characterization of the materials selected for the production of the aforementioned environmentally friendly soils for soilless cultivation. Specifically, these materials are two types of zolitic rocks with sandy granulometry and two composts produced from different food waste. In addition, the report presents the analyses carried out on 'zeo-compost' type soils obtained by mixing the two categories of materials in different proportions.

Consistently with the activities he carried out within the project, Dr. Piero Ciccioli has drafted the part of the report dealing with the selection of zeolitic materials potentially suitable for experimentation and their characterization by means of XRP D-RIR, CEC AMAS, FT-IR, TGA-DTG-DTA and solid state ¹⁹Si and ²⁷At MAS NMR spectroscopy. All this in order to verify the

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**Technical and scientific reports
registered at CNR structures or
at other public or private
institutions of national and
international character**

actual performance of these zeolite as natural soil improvers and water use efficiency improvement materials (pp. 10-23). In addition, he contributed to the critical analysis of the data collected on the 'zeo-composts' obtained (pp. 28 and 29).

Ciccioli P., Belardi G., Lilla L. (2021)

Rapporto tecnico-scientifico sulla caratterizzazione delle murature della cripta di Sant'Agnese in Agone (Roma) e risultati della sperimentazione svolta da ISB-CNR al fine di verificare l'efficacia dell'impianto pilota di RI.EL.CO. Impianti S.r.l., installato nella cripta stessa per migliorare le condizioni termo-igrometriche indoor

32-page technical-scientific report commissioned by the Rectory of Sant'Agnese in Agone (Rome) and dedicated to present and discuss the results of the survey and experimentation activities coordinated by Dr. Piero Ciccioli and performed in the Crypt of Sant'Agnese in Agone in order to set-up a protocol suitable for its conservation.

The report, written by Dr. Piero Ciccioli by integrating also the contributions of the other two co-authors, presents and discusses:

- the characterization of the quality of the stone walls of the crypt and their composition in terms of lithotypes used;
- the identification and characterization of the types of stone material and surface coating present in the walls of the crypt through XRPD, TGA-DTA-DTG and FT-IR analyses;
- Identification of the most representative material of the walls of the crypt, design and development of a experimentation aimed at verifying the effectiveness of the pilot plant of RI.EL.CO. Impianti S.r.l., installed in the crypt itself to improve indoor thermo-hygrometric conditions;
- Presentation and critical discussion of the results of gravimetric and thermogravimetric analyses carried out on samples of material taken from stone segments used as test material for experimentation.

The report was delivered to the Rectory of Sant'Agnese in Agone, which had commissioned the experiment and, subsequently, was presented by Dr. Piero Ciccioli to a group of Vatican restoration experts belonging to the "Technical-scientific-pastoral Commission for Restoration" which approved it and granted to the partners the final balance of the contract.

Ciccioli P., Ragni P., Matteucci G., Veltri A., Vivona S. (2020)

CHERISH National Report – Italy

52-page technical-scientific report on the state of the art of sustainable valorization of Italian Cultural and Natural Heritage, produced for the European Erasmus+ project "*CHERISH: Cultural and Natural Heritage Integrated System: a multidisciplinary approach to promote sustainable tourism*".

The report, written by Dr. Piero Ciccioli by integrating also the contributions of the other four co-authors, presents and discusses the main issues and excellences that are detectable at national level and concern the sustainable management of Cultural and Natural Heritage (definable, as a whole, as Non-Reproducible Goods, NRGs). To this end, the report analyses the most relevant strength and the most pressing issue that can be identified at national level in the field of the valorisation of NRGs in relation to each of the three dimensions of sustainable development (environmental, economic and social). The document also presents how these key characteristics of the national management of the NRGs positively and negatively affect sustainable tourism, as well as the achievement of specific Sustainable Development Goals foreseen for the year 2030.

Mabilia R., Pizzo B., Varriale A., Ciccioli P., Gualtieri S. (2109)

Relazione scientifica finale delle Unità Operative partecipanti al Progetto BRIC ID 06 FREEFORES: Sviluppo nuovi collanti a base organica e inorganica come sostitutivi delle resine contenenti formaldeide nei prodotti legnosi usati nell'edilizia e negli arredi

Final scientific report of 112 pages dedicated to present and discuss the research activities performed within the second year of the BRIC "*FREEFORES*" project, aimed at the development of new organic and inorganic adhesives not containing formaldehyde to be used in the industry of wooden products for construction and furniture. As Scientific Director of the activities performed by the Project Operational Unit 3, Dr. Piero Ciccioli reported on:

- Final development of the methodology aimed at the accurate evaluation of emissions of HCHO, volatile organic compounds (VOC) and fine particulate matter (PM 2.5) produced by the sawing process of the wood materials used in the project (poplar and fir) both glued with UF industrial resins and with formaldehyde-free glues developed

within the project itself (pp. 72-79).

- Formulation, synthesis and physical and chemical characterization of new geopolymeric inorganic resins that can be used as an alternative to formaldehyde-containing adhesives commonly used in construction sector and in the production of wooden furniture. Consequent verification of their mechanical performance on fir wood for structural uses (pp. 80-83).
- Measurement of HCHO, VOC and Particulate Material emissions in sawing process the fir and poplar glued both with industrial resins and those developed in the project (pp. 84-100).

The report was sent to INAIL, as it was the manager of the BRIC National Programme, and approved by that Institute, which granted the partners the final balance of the project.

Mabilia R., Pizzo B., Varriale A., Ciccio P., Gualtieri S. (2108)

Relazione scientifica intermedia delle Unità Operative partecipanti al Progetto BRIC ID 06 FREEFORES: Sviluppo nuovi collanti a base organica e inorganica come sostitutivi delle resine contenenti formaldeide nei prodotti legnosi usati nell'edilizia e negli arredi

76-page *ad-interim* scientific report dedicated to present and discuss the research activities carried out during the first year of the BRIC "FREEFORES" project, aimed at developing new organic and inorganic adhesives not containing formaldehyde to be used in the industry of wooden products for construction and furniture. As Scientific Director of the activities performed by the Project Operational Unit 3, Dr. Piero Ciccio reported on:

- Development of a methodology for the rapid and *real-time* measurement of formaldehyde emission (HCHO) and other volatile organic compounds (VOCs) by both industrial glues and those developed in the project as well as by wood materials glued with them (pp. 64-71).
- Preliminary research activities for the formulation, synthesis and physical and chemical characterization of new geopolymeric inorganic resins that can be employed as an alternative to formaldehyde-containing adhesives commonly used in construction and in the production of wooden furniture (pp. 72-74).

The report was sent to INAIL, as it was the manager of the BRIC National Programme, and approved by that Institute, which granted the partners funding for thesecond year of the project.

Ciccio P., Gualtieri S., Belardi G. (2017)

Rapporto Scientifico dei Risultati Ottenuti nell'Attività del Progetto Cluster "Sustainable Manufacturing": "Produzione di Geopolimeri da Residui Industriali quali Residui di Fonderia e Fly Ash"

15-page technical-scientific report that summarizes in a concise form the activities performed by the IMC-CNR Operating Unit coordinated by Dr. Piero Ciccio for the "Sustainable Manufacturing" Cluster Project, starting from the beginning of the project (December 2014) until its conclusion (December 2016), divided into the five work progress phases (namely 'SAL') foreseen (SAL 1 2014, SAL 2 first semester 2015, SAL 3 second half 2015, SAL 4 first semester 2016, SAL 5 second half 2016). The activity was aimed at the formulation and synthesis of new geopolymeric binders with reduced CO₂ emissions and produced by using natural clays and secondary raw materials of industrial origin. The report, prepared by Dr. Piero Ciccio integrating also the contributions of the other co-authors, reported on:

- Selection of kaolin-based clays suitable for obtaining, through heat treatment, metakaolins that can be successfully used in the synthesis of geopolymers. Physical and chemical characterization of the metakaolins obtained by means of XRPD-RIR, FT-IR, TGA-DTG-DTA analytical investigations and solid state ¹⁹Si and ²⁷Al MAS NMR spectroscopy (SAL 1).
- Formulation of different geopolymeric binders of potassium polysiloxosialate type (K-PSS) and their physical, chemical and mechanical characterization (by means of solid state ¹⁹Si and ²⁷Al MAS NMR spectroscopy, determination of uniaxial compressive strength after 90 days and determination of the thermal softening point), aimed at selecting the one that guaranteed the best performance as a cementitious binder (SAL 2).
- Selection and chemical and granulometric characterization of urban solid waste fly-ash type originated from incinerator (FA-MSWI), by means of XRPD and particle size distribution analyses. Addition of FA-MSWI to the K-PSS binder and assessment of detectable criticalities (in particular development of gases that made the produced binder alveolate and, therefore, mechanically weak) (SAL 3).

- Development of a washing treatment with water to make FA-MSWI more compatible with K-PSS and verification of its effectiveness for the synthesis of the geopolymeric binder (SAL 4).
- Physical, chemical and mechanical characterization of the geopolymer obtained in order to verify that the latter had properties suitable for its use in the building sector (SAL 5).

The report was sent to ITIA-CNR, as it was the manager of the Cluster Project "*Sustainable Manufacturing*".

Ciccioli P., Spiders P. (2017)

EN-VET Environmental Sustainability National Report – Italy

27-page technical-scientific report on the state of the art of environmental sustainability in Italy produced within the framework of the European Erasmus+ project "*EnVet: Environmental Sustainability in the VET System: a Powerful Tool for the Future*". The report, written by Dr. Piero Ciccioli integrating also the contribution of the other co-author, presents and critically discusses the main environmental priorities and the state of the art achieved in the field of environmental sustainability that have been identified at national level. The document has been produced taking into account all three dimensions of sustainable development (environmental, economic and social) and with particular attention paid to those *Sustainable Development Goals* (SDGs) that are specifically aimed at improving environmental sustainability.

Ciccioli Pa., Ciccioli Pi., Plescia P., Gualtieri S., Contini G. (2015)

Second Year Scientific Report of the MECAGEOPOLY Project: "Mecano-chemistry: An Innovative Process in the Industrial Production of Poly-sialate (PS) and Poly-sialnoxialate (PSS) Geopolymeric Binders to Be Used in Building Construction"

42-pages final scientific report of the Flagship Project Factory of the Future "*MECAGEOPOLY*", aimed at developing new cementitious binders based on geopolymers by using mechano-chemical processes for the decarbonization of industrial emissions in cement production. As Scientific Director of the IMC-CNR Project Operational Unit and Work Package Leader of Work Package 5, Dr. Piero Ciccioli reported on:

- Determination of chemical-mineralogical variations and degree of activation of tuffs with different Si/Al ratio that have been mechano-chemically treated (pp. 5-14).
- Synthesis and physical, mechanical and chemical characterization of polysiloxosialate geopolymeric binder obtained from tuffs activated through mechano-chemical process (pp. 16-30).

The report was sent to ITIA-CNR, as it was the manager of the Flagship Project Factory of the Future, and approved by that Institute, which granted the partners the final balance of the project.

Ciccioli Pa, Ciccioli Pi., Plescia P., Gualtieri S., Soragni E., Contini G. (2013)

First Year Scientific Report of the MECAGEOPOLY Project: "Mecano-chemistry: An Innovative Process in the Industrial Production of Poly-sialate (PS) and Poly-sialnoxialate (PSS) Geopolymeric Binders to Be Used in Building Construction"

32-page *ad-interim* scientific report of the Flagship Project Factory of the Future "*MECAGEOPOLY*", aimed at developing new cementitious binders based on geopolymers by using mechano-chemical processes for the decarbonization of industrial emissions in cement production. As Scientific Director of the IMC-CNR Project Operational Unit and Work Package Leader of Work Package 1, Dr. Piero Ciccioli reported on:

- Selection, collection, treatment and characterization of the most suitable materials to be used in the Project. These turned out to be, specifically, a kaolin commonly used in the ceramic industry and two different types of volcanic tuffs commonly mined in Italy. One of the tuffs was vitric type (welded tuff), while the other was lithified by secondary mineralization of zeolites (pp.4-15).
- Definition of the optimal mechano-chemical and thermal conditions for the activation of the selected kaolin in order to obtain metakaolin suitable for the synthesis of potassium-based polysiloxoxylated geopolymers (K-PSS) through the reaction with silica glass and alkalis (pp. 19-22).

The report was sent to ITIA-CNR, as it was the manager of the Flagship Project Factory of the Future, and approved by that Institute, which granted the partners the funding for the second year of the project.

Ursini O., Lilla L., Ciccioli P a., Ciccioli Pi. and Angelini G. (2012)

Nuovi tessuti, pellicole e lamine polimeriche naturali e artificiali, caratterizzate da alte

Piero Ciccioli

capacità adsorbenti e di scambio cationico, basati su Zeoliti naturali dei depositi vulcanici del Lazio, per usi industriali e per l'ambiente. ZEOTEX

7-page scientific report summarizing the activities carried out by IMC-CNR within the second year of the FILAS Lazio "ZEOTEX" project. Consistently with the activities he performed within the framework of said project, Dr. Piero Ciccioli reported on:

- Development of a pilot apparatus for the physical absorption of micronized tuff particles on fabrics suitable for the preparation of organic-inorganic hybrid materials, to be used for the filtration of airborne contaminants in indoor environments (pp. 1 and 2).
- Evaluation of the technical parameters that allow the upscaling of the pilot apparatus to an industrial scale (pp. 6 and 7).

Ciccioli P. (2011)

Rapporto tecnico annuale del Dr. Piero Ciccioli sull'avanzamento del progetto ZEOTEX finanziato dalla Regione Lazio nell'ambito FILAS

20-page scientific report written by Dr. Piero Ciccioli on the activities he performed within the first year of the FILAS Lazio "ZEOTEX" project. These activities concerned:

- Selection and sampling of Lazio volcanic tuffs exhibiting high zeolite content.
- Determination of the content and type of zeolitic minerals present in them by means of TGA-DTA-DTG, XRPD-RIR analyses, determination of cation exchange capacity (CEC), solid state ^1H , ^{19}Si and ^{27}Al MAS NMR spectroscopy.

Ciccioli Pa., Ursini O., Lilla E. and Ciccioli Pi. (2008)

Relazione tecnica sul rilascio del Rame dal Peperino Tipico Viterbese e analisi dei processi che ne determinano il contenuto nei fanghi di risulta da conferire a discarica effettuato sulle Ditte VIMET S.R.L. e PEPERINO PERLA S.R.L.

12-pages technical report commissioned by the Municipality of Vitorchiano (Viterbo, Lazio) and aimed at verifying the actual toxicity (with particular reference to the copper content) of the stone material "Peperino Tipico Viterbese" quarried in the territory of that municipality. As contract scientific consultant of IMC-CNR for the geological aspects of the material and mining activity in question, Dr. Piero Ciccioli reported on:

- The geological characteristics of the "Peperino Tipico Viterbese", the estimate of its natural content in Copper on the basis of the knowledge of Lazio volcanism and the genesis of the material (pp. 3-7).
- The possible contamination during the extraction and processing of the material and any copper enrichment that may be caused by agents external to the quarry and its processes (e.g. pollution given by percolating water, fertilizing substances) (pp. 8 and 9).

**Posters and oral presentations
at international or national
conferences**

Ciccioli P., Coratella R., D'Esposito F., Ragni P. (2022)

Results of the activities performed with VET students/learners and aimed at testing the products of the Erasmus+ transnational education project "CHERISH - Cultural and natural HERItage: a Sustainable tourism VET integrated Approach"

Oral presentation at "ICERI22 - 15 th annual International Conference of Education, Research and Innovation", Seville, Spain, November 7 th-9 th 2022, pp. 7753-7763 in the Proceedings, ISSN: 2340-1095, ISBN: 978-84-09-45476-1

Esposito A., Pane C., Ragosta G., Spaccini R., Ciccioli P., Altieri R. (2022)

Novel substrates based on high-quality compost mixed to zeolites

Poster presented at the "XL SICA Congress - Conciliating Sustainability, Resilience, and Food Quality - New challenges for a 2030 Agriculture". Pisa, Italy, September 5 th-7 th 2022, pp. 140-142 in the Proceedings

Ciccioli P., Coratella R., D'Esposito F., Ragni P. (2022)

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Ciccioli P. (2022)

Green Jobs

Plenary lecture as Invited Speaker at the Erasmus+ INAPP event "Training and Cooperation Activities (TCA) - Thematic seminar Erasmus+ and green jobs", Rome, Italy, May 18th 2022

Ciccioli P., Ragni P. (2021)

The methodological approach developed for the European transnational education project "CHERISH - Cultural and natural HERItage: a Sustainable tourism VET integrated Approach"

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Oral presentation at the conference "Technologies for the Recovery of Built. Humidity in construction: diagnosis and methods of intervention. Dal Taglio Meccanico alla Tecnica a Neutralizzazione di Carica", Matera, Italy, April 4th-5th 2019, pp. 141-149 in the Proceedings, ISBN: 978-88-6026-270-7

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Replacing formaldehyde resin in wood industry with new adhesives based on Si-Al geopolymers: the FREEFORES Project

Oral presentation at the International Conference "3rd European Symposium on Surface Science", organized by EMASST, Nice, France, October 17th-19th 2018, p. 18 of the Book of abstracts, ISBN: 978-88-943897-0-8

Ragni P., Ciccioli P. (2018)

Environment in the VET system: a powerful tool for the future (EN-VET)

Oral presentation at International Conference "EDULearn18 - Education and new Learning Technologies", Palma de Mallorca, Spain, July 2nd-4th 2018, pp. 702-712 in the Proceedings, ISSN: 2340-1117, ISBN 978-84-09-02709-5

Ciccioli P., Sovolev A., Capitani D., Pallozzi E., Ciccioli P. (2018)

PTR-MS-TOF · ¹H NMR and ¹³C MAS NMR for the determination of organic compounds produced by fibre degradation in the MELISSA project

Oral Presentation at the Joint Agrospace Workshop on "The current and future ways to Closed Life Support Systems" Organized by the MELISSA Consortium in Rome, Italy, May 16th-18th 2018, p. 122 in the Book of Abstracts

Ragni P., Ciccioli P. (2018)

Environment in the VET system: a powerful tool for the future

Oral presentation at International Conference on "Effectiveness and efficiency of education", Ulaanbataar, Mongolia, May 3rd-5th 2018, p p. 164-172 in the Proceedings

Silibello C.*, Baraldi R., Rapparini F., Facini O., Neri L., Brilli F., Fares S., Finardi S., Magliulo E., Ciccioli P., Ciccioli P. (2017)

Modelling of Biogenic Volatile Organic Compound Emission over Italy

Oral presentation at the "18th International Conference on Harmonization within Atmospheric Dispersion Modelling for Regulatory Purposes", Bologna, Italy, October 9th-12th 2017, pp.14-18 in the Book of Proceedings.

Ciccioli P. (2017)

Mechanochemical activation of natural kaolins: a sustainable, low carbon, process for the synthesis of geopolymeric cements

Oral presentation at the "Conference of the Department of Chemical Sciences and Materials Technologies", Alghero, Italy, October 19th-20th 2017, pp. 19-20 in the Book of Abstracts.

Mabilia R., Pizzo B., Ciccioli P., Tassone P. (2017)

Development of new organic and inorganic adhesives as substitutes of formaldehyde containing resins in wood products – FREEFORES

Oral presentation at the "19th International Symposium on Environmental Pollution and its Impact on Life in the Mediterranean Region" organized by MESAEP in Rome, Italy, October 4th-6th 2017, p. 230 of the Book of Abstracts.

Plescia P., Tempesta E., Di Stefano A., **Ciccioli P.** (2016)

Synthesis of zeolites from mechano-chemically activated ashes and sand of the Etna volcano: removal properties of contaminants and pozzolanic activity.

Oral presentation at the "5th International Conference on Industrial & Hazardous Waste Management", Crete, Greece, September 27th-30th 2016, ISBN: 978-960-8475-24-3.

Baraldi R., Rapparini F., Facini O., Neri L., Brilli F., Fares S., Gioli B., Zaldei A., Vagnoli C., Brusasca G., Finardi S., Gasbarra D., Magliulo V., **Ciccioli P.**, Ciccioli Pa. (2016)

A model validation of the complex photochemical processes occurring in the gulf of Naples

Poster presented at the "Gordon Research Conference on Biogenic Hydrocarbons & the Atmosphere Diversity of Sources, Sinks, and Impacts of Atmospheric Organics", Girona, Spain, June 26th - July 1st 2016.

Ambrosini L., **Ciccioli P.**, Genovese L. (2015)

La necropoli rupestre di Norchia (VT): proposte di conservazione e valorizzazione

Oral presentation at the "International Conference on Preservation and Enhancement of Cultural Heritage: The "T.He.T.A." Project and Research Experiences in the European Context" Gioia del Colle, Italy, October 21th-22th 2014, pp. 191-206 in the Book of Proceedings, ISBN: 978-88-8080-186-3.

Ciccioli P., Capitani D., Proietti N., Gualtieri S., Soragni E., Belardi G., Plescia P., Contini G. (2014)

Mechano-chemical processing of kaolins for the synthesis of potassium- based poly-siloxo sialate (K-PSS) geopolymeric binders.

Oral presentation at the "1st European Symposium on Surface Science", organized by EMASST, Rome, Italy, November 26th-28th 2014.

Galli E., Polcaro C. M., **Ciccioli P.**, Donati E. (2014)

Degradation of 2-chlorophenol by laccase-zeolite biocatalyst

Oral presentation at the "18th International Trade Fair of Material & Energy Recovery and Sustainable Development, Ecomondo", Rimini, Italy, November 5th-8th 2014, pp. 785-790 in the Book of Proceedings.

Plescia P., Cossari P., **Ciccioli P.**, Reale M. (2010)

The Process Oxichlor: A Suitable Electrochemical Method for the In-situ Redcution of Organic Contaminants in Sewage Sludges and Contaminated Soils

Oral presentation at the "Indo-Italian Workshop on Impact of Climate Change and Anthropogenic Activities on Soil and Water Resources" Roorkee Uttarakhand, India, October 20th-24th 2010, Italian Embassy of New Delhi ,CNR - Italy, IIT – India.

Plescia P., Cossari P., **Ciccioli P.**, Reale M. (2010)

Removal of Hydrocarbons from contaminated water using a mechanically treated polyurthane-based material recovered from wasted appliances and cars.

Oral presentation at the "Indo-Italian Workshop on Sustainable Development of Ground Water Resources", Roorkee Uttarakhand, India, October 20th-24th 2010, Italian Embassy of New Delhi, CNR - Italy, IIT – India.

Ciccioli P., Capitani D., Plescia P. (2009)

Factors responsible for the fast surface and structural decay of the rock-cut tombs of the Etruscan necropolis of Norchia (Northern Latium, Italy) and possible strategies for their conservation.

Oral presentation at session B5 of the "4th International Congress on Science and Technology for the Safeguard of Cultural Heritage of the Mediterranean Basin", Cairo, Egypt, December 6th-8th 2009, pp. 164-169 of the Book of Proceedings (Volume II), ISBN 978-88-96680-32-2.

Perugia 16/02/2023

(place and date)

(signature in full and legible)