

Personal Details

Surname: Bontempi

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Gender: female

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Curriculum: <https://www.unibs.it/it/ugov/person/1936>

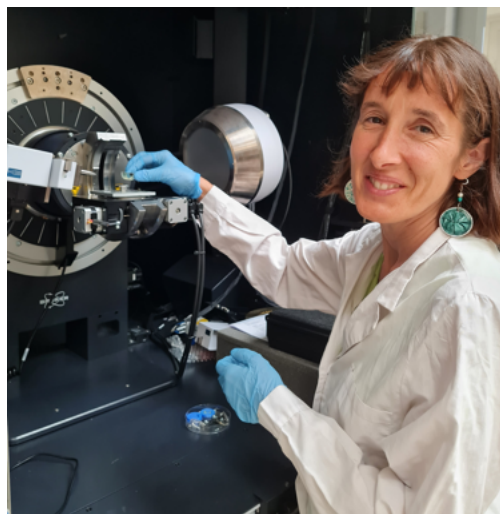
Scopus Author ID: [7004176714](https://orcid.org/0000-0003-1656-7506) (more than 270 publications)

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Top Italian Scientist (<https://topitalianscientists.org/>) in Natural & Environmental Sciences, AREA: environmental chemistry



Organization and Position: **INSTM, UdR Brescia, Full Professor in Fundamental Chemistry for Technologies (from 2011) at the University of Brescia (Italy).**

Education and training: **Elza Bontempi obtained her Ph.D. in Materials for Engineering in 2001. Her doctoral studies were mainly focused on materials characterizations using advanced X-rays characterization techniques. During the Ph.D. she worked in Grenoble (France), at the “Laboratoire de Crystallographie” in the group of professor Raoux, director of the Soleil Synchrotron.**

Professional Summary

Professional experience: **Elza is a researcher with expertise in all the aspects connected with circular economy, with an interdisciplinary skill set. Indeed, she has an extensive knowledge about materials and eco-materials, because she focalized her research on sustainability innovation (e.g., alternatives to waste landfilling), strategic environmental management, and sustainable raw materials recovery. Moreover, she also contributed to develop new strategies to promote the circular economy diffusion, by proposing preliminary simplified approaches to LCA, mainly dedicated to SMEs and legislators. Finally, to advance the state of play about circular economy in higher education, she published a book about “Raw materials substitution sustainability” in 2017.**

Elza coordinated several projects about circular economy (see the project section), and is assisting governmental entities (mainly Lombardy Region), on a wide range of sustainability strategies and policy development. In particular, she’s the scientific reference for circular economy of Lombardy Energy Cleantech Cluster.

She is currently responsible of sustainability development actions for INSTM consortium.

Total number of publications and h-index.

See: <https://scholar.google.com/citations?hl=it&user=VFNuQCoAAAAJ>

Main research results

1) She developed a new technique for entrapment of heavy metals from municipal solid waste incinerator fly ash, by using different amorphous silica sources.

The recovery of waste and its reuse to produce high added-value and sustainable products (in the frame of CE principles) allowed her to obtain a European prize in 2012 (see Prize section).

The proposed technologies were patented, and one patent was transferred to a Slovakian small industry.

The results of this activities allowed her to achieve a European prize, about raw materials substitution, in 2016 (see Prize section).

2) She developed a new simplified method to evaluate the sustainability of raw material substitution (2017 - **Journal of Cleaner Production**, 162 pp. 162-169), that allows to support small industries and public authorities in CE principles. **Scopus Citation Benchmarking shows that the paper falls in the 99th percentile for citations** (it is in the top of all published research of the same age - <https://www.scopus.com/record/pubmetrics.uri?eid=2-s2.0-85024099428&origin=recordpage>).

This work was also highlighted by Science for Environment Policy, that is the news and information service published by Directorate-General Environment, European Commission. The news can be downloaded at:

http://ec.europa.eu/environment/integration/research/newsalert/pdf/new_approach_evaluating_sustainability_substituting_raw_materials_510na3_en.pdf

3) She contributed to develop a new method for heavy metals detection in air particulate matter (PM) filters, based on Total Reflection X-Ray Fluorescence (TXRF) technique. The main advantage of this method, related to conventional ones, is that the filter can be directly analyzed, without digestion, making the analysis much more reliable, fast, economic and sustainable. This method was developed in a new analysis technology that allowed to found a University Spinoff: SMART SOLUTIONS. Elza Bontempi is a co-founder of the Spinoff.

4) She has very recently proposed a new chemistry approach “Azure chemistry”, to go beyond Green Chemistry. The Azure chemistry goal is to restore or reconstruct the ecosystems by sustainable solutions in terms of energy, materials and emissions. Azure Chemistry concerns, for example, carbon dioxide sequestration, PM pollution reduction, waste minimization, and energy neutrality. It requires low-energy paths, manufacturing and technologies reducing the use of non-renewable resources, and in which wastes and by-products are employed. Overall, Azure Chemistry approach must minimize the global impact of the remediation processes.

Elza was responsible of more than 20 post-docs and 9 Ph.D students.

INTERNATIONAL PROJECTS RESPONSIBILITY:

Elza Bontempi collaborated in the development of several international and national projects. From 2004 she started to be responsible of international projects. The international projects with high involvement of the Principal Investigator are reported in the following:

- 2004 Project leader of the project "X-ray reflectivity measurements for evaluation of thin films and multilayers" VAMAS (THE VERSAILLES PROJECT on ADVANCED MATERIALS and STANDARDS)
- 2006 Responsible for Chemistry for Technologies Laboratory for the PHIME (Public health impact of long-term, low-level mixed element exposure in susceptible population strata) project, sponsored by the EU www.phime.org.
- 2008 Responsible for Chemistry for Technologies Laboratory of the Galileo project with France for the development of instrument to study mechanical properties of thin films by means of X-Ray Diffraction techniques.
- 2008 Project coordinator of a project about new nanotechnologies development with India, founded from Italian Ministry of Research.
- 2010 Scientific Responsible of the European project "COSMOS" (Life+ 2008 call) concerning the development of new procedure for municipal solid waste incinerator fly ash inertization.
- 2010 Responsible for Chemistry for Technologies Laboratory of "Neurologic function in children exposed to ambient manganese" project, founded by National Institute of Health (USA).
- 2010 Responsible for Chemistry for Technologies Laboratory of "Metals and Children" project (n. 170174 SAL-68), with Université du Québec, Montreal, founded by Regione Lombardia.
- 2011 Project coordinator of a project of researchers exchange with India, regarding heavy metals monitoring, founded from Italian Ministry of Research (Prot. number CII10T43QQ).
- 2013 Scientific Responsible of the European project "COSMOS-RICE" (Life+ 2011 call) concerning the development of new procedure for municipal solid waste incinerator fly ash inertization by using rice husk ash.
- 2014 Responsible for Chemistry for Technologies Laboratory of the MED (Life+2013 call) project, "MED" Medical Equipment Discarded - A new Integrate system to reduce waste by medical equipment and medical WEEE
- 2014 Scientific Responsible of European project: EQUATOR - Employ of Waste instead of Quarry for sUBstitution of AnTimOny as fire Retardant additive - in the frame of "Raw Material Commitments"
- 2016 Representative for Chemistry for Technologies Laboratory of the COST-Action "Mining the European Anthroposphere" (MINEA) - Working Group (WG) A3 - "Resource potential of solid residues from waste incineration" (active)

- 2018 Responsible for Chemistry for Technologies Laboratory of the European project Deasphor, Design of a product for SUBSTITUTION of phosphate rocks. - ERA-MIN Joint Call

- 2019 Responsible for Chemistry for Technologies Laboratory of project NEXT-LIB, Novel Circular Economic Approaches for Efficient Extraction of Valuables from Spent Li-Ion Batteries. - ERA-MIN Joint Call

NATIONAL PROJECTS RESPONSIBILITY:

- Responsible for Chemistry for Technologies Laboratory of project PRIN (2005) - Advanced synthesis and characterization of self-assembled and patterned magnetic systems (Italian Ministry of Research)

- Project coordinator of FCB (2012) project: Reuse of rice husk ash (Fondazione Comunità Bresciana - Foundation)

- Responsible for Chemistry for Technologies Laboratory of project NINIVE (2013) A new nano-plaster made on ecological glass (Lombardy Region)

- Project coordinator of FCB (2015) project: New bioplastics synthesis (Fondazione Comunità Bresciana - Foundation)

- Project coordinator of RISANA (2015) project: New composites obtained by sustainable fillers and bioplastics (Italian Ministry of Environment)

- Project coordinator of BASALTO (2016) project: New sustainable materials for air particulate matter capture (Lombardy Region)

- Project coordinator of SINFONIA (2016) project: Substitution of brominated flame-retardants with new sustainable fillers (University of Brescia)

- Project coordinator of RENDERING (2018) project: New sustainable composites based on ash derived from municipal wastes and sludges incineration process (Italian Ministry of Environment)

- Responsible for INSTM of the RESTART (2019) project: Recovery and treatment of food wastes to produce membranes for micropollutants reduction and jellies for food

PRIZES:

- 2012 **International prize: "what are you doing for a better society?"** (2nd position) from European Projects Association for the proposed project **about circular economy** (waste recovery)

- 2016 **International prize: "European Business Idea Competition on raw materials"** from European Institute of Innovation & Technology (EIT) Raw Materials, for the proposed **STARS project about circular economy** (waste recovery).

- 2018 Special mention on the national ITALIADECIDE prize for the development of a new material for air particulate matter trap.
- 2018 Winner of **Prize for “Enabling technologies and innovative solutions for sustainable cities”** from the Italian association for the industrial research (AIRI).
- 2018 Winner of the GAETANO MARZOTTO prize (22th November 2018) for the development of a new eco-material recovered from industrial by-products;
- 2018 Winner of the ITWIIN (ITalian Women Innovators and Inventors Network) prize (assigned on 9th November 2018 <http://www.itwiin.org/>) for the development of a new eco-material recovered from industrial by-products;
- **2019 Innovation Village Award, for the best project in the frame of Global Agenda for sustainable development** (4th April 2019).
- **2019 Bronze medal award** for the international poster contest of Remtech (the only permanent international event dedicated to remediation, climate changes, and **circular chemistry**), about a new technology for sewage sludge treatment (September 2019)
- 2020 national winner of the **ENERGY GLOBE AWARD, the most significant environmental award worldwide.**
- 2021 finalist of the international **ENERGY GLOBE AWARD prize, the most significant sustainability award worldwide**
- **2022 International prize: “SusCritMOOC business idea competition on Critical Raw Materials” from European Institute of Innovation & Technology (EIT) Raw Materials**, for a patent about the low-energy microwave carbothermal extraction of critical raw materials
- 2022 Merit for the scientific and technological results granted by the mayor of Bienno
- **2023 Finalist of the “Donna dell’anno” Award, and awarded a special mention**
- **2017-2020 TOP WORLD RESEARCHER (first position of reported 500 researchers by SciVal)** for the research topic of Waste Incineration; Municipal Solid Waste; Carbonation

PATENTS:

Patent name	Inventor(s)/applicant(s)	Year	Patent office	Patent number
METHOD FOR RECOVERING MATERIALS FROM WASTE OR SCRAPS THROUGH AN IMPROVED CARBOTHERMAL PROCESS	Bontempi, Elza; Ario Fahimi; Depero, Laura; Patrizia Frontera	2023	Patent Cooperation Treaty Application	PCT/IB2023/051034
METODO DI RECUPERO DI MATERIALI DA RIFIUTI O SCARTI TRAMITE PROCESSO CARBOTERMICO MIGLIORATO	Bontempi, Elza; Ario Fahimi; Depero, Laura; Patrizia Frontera	2022	Italian Patent	102022000002351
Processo per lo smaltimento di fanghi di depurazione di acque reflue civili e/o industriali e materiale solido sostanzialmente inerte ottenuto da ceneri di combustione	BONTEMPI, Elza; DEPERO, Laura Eleonora; NENCI, Mario (A2A AMBIENTE SPA and SMART SOLUTIONS S.R.L.)	2021	Italian Patent	102019000006651
PROCESS FOR OBTAINING A POROUS MATERIAL FROM POWDER MATERIALS, A POROUS MATERIAL AND USE THEREOF FOR THE CAPTURE OF ATMOSPHERIC PARTICULATE MATTER AND ORGANIC CONTAMINANTS [PROCÉDÉ D'OBTENTION D'UN MATÉRIAU POREUX À PARTIR DE MATÉRIEAUX PULVÉRULENTS, MATÉRIAU POREUX ET SON UTILISATION POUR LA CAPTURE DE MATIÈRE PARTICULAIRE ATMOSPHÉRIQUE ET DE CONTAMINANTS ORGANIQUES]	BONTEMPI, Elza; DEPERO, Laura Eleonora; TRECCANI, Laura(...) (CONSORZIO INTERUNIVERSITARIO NAZIONALE PER LA SCIENZA E TECNOLOGIA DEI MATERIALI (...))	2018	Patent Cooperation Treaty Application	WO2018134334
Inert Material, A Production Method Thereof From Waste Materials And Industrial Uses Thereof	Bontempi, Elza; Depero, Laura; Bosio, Alberto(...) (Velaworks s.r.o. (...))	2015	United States Patent and Trademark Office Pre-Granted Publication	US20150165499
AN INERT MATERIAL, A PRODUCTION METHOD THEREOF FROM WASTE MATERIALS AND INDUSTRIAL USES THEREOF [INERTES MATERIAL, VERFAHREN ZU SEINER HERSTELLUNG AUS ABFALLSTOFFEN UND INDUSTRIELLE VERWENDUNGEN DAVON]	BONTEMPI, Elza; DEPERO, Laura; BOSIO, Alberto(...) (Velaworks S.r.o.)	2015	European Patent Application	EP2879813
AN INERT MATERIAL, A PRODUCTION METHOD THEREOF FROM WASTE MATERIALS AND INDUSTRIAL USES THEREOF [MATÉRIAU INERTE, SON PROCÉDÉ DE PRODUCTION À PARTIR DE DÉCHETS ET USAGES INDUSTRIELS ASSOCIÉS]	BONTEMPI, Elza; DEPERO, Laura; BOSIO, Alberto(...) (UNIVERSITÀ DEGLI STUDI DI BRESCIA (...))	2014	Patent Cooperation Treaty Application	WO2014020567
WASTE TREATMENT METHOD [PROCÉDÉ DE TRAITEMENT DE DÉCHETS]	DEPERO, Laura E.; BONTEMPI, Elza; BORGESE, Laura(...) (UNIVERSITA' DEGLI STUDI DI BRESCIA (...))	2011	Patent Cooperation Treaty Application	WO2011079921
METHOD FOR THE ANALYSIS OF SAMPLES AND SAMPLE [VERFAHREN ZUR ANALYSE VON PROBEN UND PROBE]	DEPERO, Laura, E.; BONTEMPI, Elza; BORGESE, Laura(...) (Universita' degli studi di Brescia)	2011	European Patent Application	EP2310825
METHOD FOR THE ANALYSIS OF SAMPLES AND SAMPLE [PROCÉDÉ D'ANALYSE D'ÉCHANTILLONS ET ÉCHANTILLON]	DEPERO, Laura, E.; BONTEMPI, Elza; BORGESE, Laura(...) (UNIVERSITA'DEGLI STUDI DI BRESCIA (...))	2009	Patent Cooperation Treaty Application	WO2009116107

Editor experience:

2019 - Guest Associate Editor in Analytical Chemistry section of Frontiers in Chemistry

From 2019 - Editor of the "Applied Sciences" Journal

From 2020 - Editor-in-Chief of the Section Board for 'Materials Chemistry' for Materials journal

2020-21 - Guest editor of the Special Issue "Advanced Materials in Environmental Chemistry" of Molecules

2020-21 — Guest editor of the Special Issue "New Materials for Air Particulate Matter Capture" of Applied Science

2020-21 - Guest editor of the Special Issue "SARS-CoV-2 and other pathogenic microorganisms in the environment" of Environmental Research

From 2020 - Member of the Advisory Board of Heliyon journal in the Environmental Chemistry section.

2021-22 - Editor of the MDPI Topic: New Research on Detection and Removal of Emerging Pollutants

2021-22 - Guest editor of the Special Issue "The environment, epidemics and human health" of Environmental Research

From 2021 - Associated editor of Frontiers in Environmental Chemistry

From 2021 - Member of the Editorial Board of Scientific Reports (Springer Nature)

2022-23 - Guest editor of the Special Issue Water, Waste, Green Chemistry and Engineering, Renewable Energies and Environmental Technologies for Environmental Research

2023 - Editor of the MDPI Topic: Environmental and Health Issues and Solutions for Anticoccidials and other Emerging Pollutants of Special Concern

2023 - Associated Editor of the MethodsX journal for the special issue: Viruses and antibiotic resistance in the environment and health: methods and assessment

2023 - Associated editor of the Journal Frontiers in Sustainability (Springer)

2023 - Editor of the Special issues "Recycling and Reuse of End-of-Life Lithium-Ion Batteries: Challenges and Strategies" Batteries Journal (MDPI)