

## Personal Details

*Surname:* Bontempi

*Name:* Elza

*Gender:* female

**Website:** <https://elza-bontempi.unibs.it/>

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

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

**RESEARCHER ID:** <http://www.researcherid.com/rid/F-3216-2010>

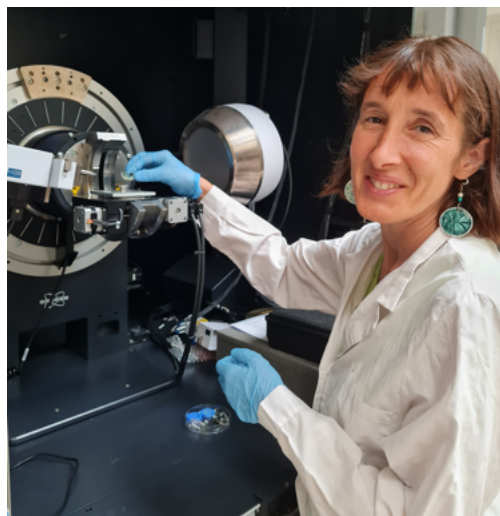
**ORCID:** [orcid.org/0000-0003-1656-7506](https://orcid.org/0000-0003-1656-7506)

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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](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](http://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?"** (2<sup>nd</sup> 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 the most significant environmental award worldwide.**

-2021 finalist of the international **ENERGY GLOBE AWARD prize, the the most significant sustainability award worldwide**

- **2017-2020 TOP WORLD RESEARCHER (first position of reported 500 researchers by SciVal)** for the research topic about Waste Incineration; Municipal Solid Waste; Carbonation

Top Authors  
 Entity: Waste Incineration; Municipal Solid Waste; Carbonation T.3432 · Year range: 2017 to 2020 ·  
 Data source: Scopus, up to 12 May 2021 ·

Author	Affiliation	Scholarly Output ↓	Views Count	Field-Weighted Citation Impact	Citation Count
Bontempi, Elza	 University of Brescia	20	2,078	2.73	383
Townsend, Timothy Glyndon	 University of Florida	20	596	1.19	156
Brouwers, H. J. H.	 Eindhoven University of Technology	16	743	1.39	162
Pan, Shu Yuan	 National Taiwan University	16	822	1.70	194
Shimaoka, Takayuki	 Kyushu University	16	420	0.63	105
Chiang, Pen-Chi	 Unknown institution	15	728	1.69	185
Chan, Weiping	 Nanyang Technological University	13	581	1.63	213

## PATENTS:

Patent name	Inventor(s)/ applicant(s)	Year	Patent office	Patent number
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 I [PROCÉDÉ D'OBTENTION D'UN MATÉRIAU POREUX À PARTIR DE MATÉRIAUX PULVÉRULENTS, MATÉRIAU POREUX ET SON UTILISATION POUR LA CAPTURE DE MATIÈRE PARTICULAIRE ATMOSPHÉRIQUE ET DE CONTAMINANTS ORGANIQUES]	Authors of Document: BONTEMPI, Elza; DEPERO, Laura Eleonora; TRECCANI, Laura(...) (CONSORZIO INTERUNIVERSITARIO NAZIONALE PER LA SCIENZA E TECNOLOGIA DEI MATERIALI (...))	Year the Document was Published2018	Source of the DocumentPatent Cooperation Treaty Application	Patent numberWO2018134334
Inert Material, A Production Method Thereof From Waste Materials And Industrial Uses Thereof	Authors of Document: Bontempi, Elza; Depero, Laura; Bosio, Alberto(...) (Velaworks s.r.o. (...))	Year the Document was Published2015	Source of the DocumentUnited States Patent and Trademark Office Pre-Granted Publication	Patent numberUS20150165499
AN INERT MATERIAL, A PRODUCTION METHOD THEREOF FROM WASTE MATERIALS AND INDUSTRIAL USES THEREOF I [INERTES MATERIAL, VERFAHREN ZU SEINER HERSTELLUNG AUS ABFALLSTOFFEN UND INDUSTRIELLE VERWENDUNGEN DAVON]	Authors of Document: BONTEMPI, Elza; DEPERO, Laura; BOSIO, Alberto(...) (Velaworks S.r.o.)	Year the Document was Published2015	Source of the DocumentEuropean Patent Application	Patent numberEP2879813
AN INERT MATERIAL, A PRODUCTION METHOD THEREOF FROM WASTE MATERIALS AND INDUSTRIAL USES THEREOF I [MATÉRIAU INERTE, SON PROCÉDÉ DE PRODUCTION À PARTIR DE DÉCHETS ET USAGES INDUSTRIELS ASSOCIÉS]	Authors of Document: BONTEMPI, Elza; DEPERO, Laura; BOSIO, Alberto(...) (UNIVERSITÀ DEGLI STUDI DI BRESCIA (...))	Year the Document was Published2014	Source of the DocumentPatent Cooperation Treaty Application	Patent numberWO2014020567
WASTE TREATMENT METHOD I [PROCÉDÉ DE TRAITEMENT DE DÉCHETS]	Authors of Document: DEPERO, Laura E.; BONTEMPI, Elza; BORGESE, Laura(...) (UNIVERSITA' DEGLI STUDI DI BRESCIA (...))	Year the Document was Published2011	Source of the DocumentPatent Cooperation Treaty Application	Patent numberWO2011079921
METHOD FOR THE ANALYSIS OF SAMPLES AND SAMPLE I [VERFAHREN ZUR ANALYSE VON PROBEN UND PROBE]	Authors of Document: DEPERO, Laura, E.; BONTEMPI, Elza; BORGESE, Laura(...) (Universita' degli studi di Brescia)	Year the Document was Published2011	Source of the DocumentEuropean Patent Application	Patent numberEP2310825
METHOD FOR THE ANALYSIS OF SAMPLES AND SAMPLE I [PROCÉDÉ D'ANALYSE D'ÉCHANTILLONS ET ÉCHANTILLON]	Authors of Document: DEPERO, Laura, E.; BONTEMPI, Elza; BORGESE, Laura(...) (UNIVERSITA'DEGLI STUDI DI BRESCIA (...))	Year the Document was Published2009	Source of the DocumentPatent Cooperation Treaty Application	Patent numberWO2009116107

*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*

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

*2021-22 - Editor of the MDPI Topics about 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)*