

Caterina Durante Curriculum Vitae

Caterina Durante is currently full-time researcher (art. 24 c.3-b L. 240/10) in Analytical Chemistry at the University of Modena and Reggio Emilia, Italy (November 2021-present). She graduated in Analytical Chemistry in March 2002. She attended a PhD in Chemistry, at the University of Modena and Reggio Emilia, from January 2003 to December 2005. The main aim of her thesis was to show how the synergistic use of multi-way data analysis and analytical chemistry can represent a powerful strategy in food authentication tasks. The main features and advantages of the multi-way approach were presented and some part of PhD work was focused on writing an algorithm extending a traditional classification method to multi-way arrays. This represented one of the first application in this research field.

During her research activities, she spent 2 months in Oxford, working in the laboratory of Prof. Hugh Cartwright, at Department of Chemistry, University of Oxford, where she gained experience in the alignment of instrumental signals. From January to March 2004, she worked at Food Science Department, University of Copenhagen, in the laboratory of Prof. Rasmus Bro, improving her knowledge on the use of multi-way techniques in the analysis of signals coming from hyphenate techniques (SPME-GC-MS; Excitation-Emission absorption etc).

Furthermore, she had the opportunity to collaborate with several national research teams such as: (i) 'Light Isotope group' of Dr F. Camin, IASMA Research and Innovation Centre (San Michele all'Adige, TN) for the development of geographical traceability methods based on light and radiogenic isotopes, (ii) the research group of Dr R. Consonni (National Research Council, Institute of Chemical Sciences and Technologies (SCITEC), Milan), for the analysis of NMR signals acquired on food for authenticity aims, (iii) the Chemometrics groups of Prof. S. Lanteri, University of Genova for the optimization of analytical methodologies based on electronic nose – mass spectrometry signals and (iv) the research group of Dr F. Becherini, National Research Council, Institute of Atmospheric Sciences and Climate, Padua, for the use of multi-way analysis on data coming from consolidation treatment for wall painting conservation.

From October 2012 to October 2016, Caterina was founding partner and CEO of 'ChemSTAMP srl' SPIN OFF of the University of Modena and Reggio Emilia. ChemSTAMP (Services for Traceability, Authenticity and Monitoring of Process and Product) was founded with the aim to support manufacturing companies in the improvement of quality of their products and process production in terms of reduction of waste and costs.

Current Research Activities

Research activities of Dr Caterina Durante are oriented towards analytical chemistry as regard both theoretical and application issues. From an analytical point of view, the research activity is focused on:

- (i) characterization and discrimination of food products and their raw materials (grape juices, cooked musts, etc.), by the analysis of volatile and fixed fraction carried out by means of micro solid phase extraction, thermo-desorption, chromatographic and spectroscopic techniques and electronic nose based on mass spectrometry;
- ii) theoretical, with particular attention to the study of interferences, and practical/experimental insights of innovative analytical technologies based on high resolution plasma spectrometry with multi-collector detector aimed at the determination of isotopic ratios of different elements (i.e., isotope ratios of Sr, Hg, Pb and B) in environmental and food context;
- (iii) development of analytical methodologies for supply chain and geographic traceability and authenticity of food by multivariate analysis and primary indicators (isotopic ratios and elemental composition) and secondary indicators (chemical composition of the product, e.g., aroma profile, organic acid content, etc.) obtained by spectroscopic (AAS, NIR, etc.) and spectrometric (ICP/MS, MC-HR-ICP MS) techniques;
- (iv) development of analytical methodologies (based on multivariate control charts) for monitoring production processes and

quality of final product;

(v) optimization of chemical/physical/instrumental parameters that mainly influence an analytical procedure;

(vi) development of analytical methodologies for tracing Hg pathway by isotope determination.

From a theoretical point of view, an important aspect is played by the study and application of chemometrics methods for data analysis, as regards the development of new algorithms (i) based on wavelet packet transform, (ii) for the alignment of chromatographic signals, (iii) for the development of classification by means of data characterized by more than two source of variability and (iv) for the implementation of data fusion approaches.

Bibliometric Indexes

Scientific production: 2004-2022. She is author or co-author of **9 chapters** of scientific book and **45 publications** in ISI international peer reviewed journals, of which 12 as first, last, or corresponding author.

Nine publications are on journals belonging to Q1, 7 to Q2 and 1 to Q3, according to Clarivate Journal Citation Metrics (Chemistry, Analytical). She currently has an h-index of 23 and 1270 citations, according to Scopus.

Awards and other recognitions

-Best PhD student award, Chemical Italian Society, Emilia Romagna session, 2004

-Best innovative spin off award, sixth edition of 'Intraprendere Modena' (www.intraprendere.modena.it)

-Best poster Award: M. Li Vigni, M. Cocchi, C. Durante, A. Ulrici et al.

'Wheat Flour formulation by Mixture Design and study of its properties and performance'

11th Scandinavian Symposium on Chemometrics, SSC11, 2009, Loen- Norway.

-Best Poster Award: M. Cocchi, F. Marini, C. Durante et al.

Classification Methods for Multi-Way Arrays in Food Authenticity context

13 Chemometrics in Analytical Chemistry, Budapest (Hungary), 2012.

-Best Poster Award: M. Silvestri, E. Salvatore, A. Elia, C. Durante et al.

Cocchi. Data Fusion approach for the Varietal Classification of Lambrusco P.D.O. Wines

VIII Colloquium Chemiometricum Mediterraneum, Bevagna, Italy, 2013

Participation in previous Italian or international projects (assigned on the basis of external peer reviewing)

- Researcher of the staff involved in the unit research of AGRIFARM 2003 project: Authenticity of typical products (From 2003 to 2003). Main research activity: she worked in the chemical characterization of volatile fraction of food by means chromatographic techniques
- Researcher of the staff involved in the unit research of 'CABM2004 project: traceability system for grape must of Emilia Romagna (From 2004 to 2004). In this project, she contributed in development of traceability model by means the analysis of chromatographic and spectroscopic (NIR) signals of investigated products.
- Researcher of the staff involved in the unit research: 'PRIN2009: The use of 'not traditional stable isotope of Fe, Cr and Hg' as tracer of environmental problems: the Laguna di Marano e Grado case of study' (From 2009 to 2011). In this project, she contributed to the development of analytical methodologies for the determination Hg isotopes with HR-ICP-MS and experimental design techniques.
- Scientific coordinator of CRPV 2010 project: development of innovative and advanced analytical methodologies for the authenticity of food with regulated production (From 2010 to 2012). One of the main tasks was the coordination of

the different analytical phases for the development of authenticity methodologies based on primary (elemental concentration and Sr-isotope ratio) and secondary (NIR and MIR signals) indicators.

- Principal investigator of research unit 'Heavy Isotope' in 'AGER 2009 Enology project: New Analytical Methodologies for Geographical and Varietal Traceability of Oenological Products (From 2011 to 2014). In this project, she contributed in development of innovative procedure for the planning of representative and systematic sampling by means of Experimental Design Techniques and in the optimization of different analytical procedures (i.e., pretreatment of samples before the isotopic measurements, correction of mass bias phenomena in the Sr-isotope measurements, optimization of analytical methodology able to reduce the chemical interference on the monitored $^{86}\text{Sr}/^{87}\text{Sr}$)
- Principal investigator of research unit 'Primary indicators' in the project: 'Valorization and protection of the Vignola IGP Cherry' financed by the Vignola Foundation (From 2014 to 2015). In this project, she planned a representative and systematic sampling of the investigated matrices and coordinate the different scientific phases for the determination of primary indicators and the development of statistical model.
- Research of the staff involved in the unit research of 'Mountain ID' project: 'Mountain product: analytical methodologies for identity, sustainability and valorization' (FAR2021 MISSION oriented-Linea FOMO; From 1.12.2021 to 1.06.2022). In this project, she is going to contribute with the development of chemometrics models to support the valorization of Mountain products.
- Member of COST ACTION CA19145 - European Network for assuring food integrity using non-destructive spectral sensors (From 1.11.2021 to 31.10.2023)

Additional information

Communications at conferences: 29 oral communications and 34 posters at national and international conferences

Reviewer activity:

- Review Editor of Editorial Board di Analytical Chemistry (Frontiers section in Chemistry).
- Guest Editor Guest Editors for the Special Issue "Analysis of Volatile and Odor Compounds in Foods—Second Edition", in the open-access journal *Molecules* (ISSN 1420-3049)
- Review in Current opinion in food science, Chemometrics and Intelligent Laboratory Systems, *Analytica Chimica Acta*

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