Personal information

Name / Surname	**Alessandro Nardecchia**
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Date of birth	09/06/1988
ORCID iD / Scopus Author ID	0000-0003-3131-8436 / 57211554280
ResearchGate	https://www.researchgate.net/profile/Alessandro-Nardecchia
Occupation fields	Analytical Chemistry, Chemometrics, Data Analysis, Image Analysis, Spectroscopy

Education

2007 – 2014 — **Bachelor of Science in Chemistry**
Università "Tor Vergata", Rome – Italy
Thesis: *Domus Valerii: application of diagnostic techniques on North wall frescos before restoration*
Supervisors: Prof. Laura Micheli and Prof. Marilena Carbone

2015 – 2017 — **Cum Laude Master of Science in Analytical Chemistry**
"La Sapienza" – Università di Roma, Rome – Italy
Thesis: *Contamination of potato food products with antisprouting agent 2,6-diisopropylnaphtalene*
Supervisors: Prof. Federico Marini ("La Sapienza" – Università di Roma) and Prof. Bekzod Khakimov (Copenhagen University)

2019 – 2022 — **Philosophiae Doctor in Analytical Chemistry and Chemometrics (Doctor Europaeus)**
Université de Lille, Lille – France
Thesis: *Chemometric exploration in hyperspectral imaging in the framework of big data and multimodality*
Supervisor: Prof. Ludovic Duponchel

Scholarships and traineeships

01-05/2017 and 01-08/2018 — **Research stay**
Copenhagen University, Copenhagen – Denmark
Topic: *Research in chemometrics, foodomics and metabolomics using different analytical techniques (mainly GC/MS and ICP). Second stay financed by the scholarship program 'Torno Subito 2017/18' promoted by Regione Lazio (Italy)*
Supervisors: Prof. Bekzod Khakimov and Prof. Klavs Sørensen

09/2018 – 02/2019 — **Research stay**
"La Sapienza" – Università di Roma, Rome – Italy
Topic: *Research in chemometrics and food commodity analysis using spectroscopy (NIR). Stay financed by the scholarship program 'Torno Subito 2017/18' promoted by Regione Lazio (Italy)*
Supervisor: Prof. Federico Marini

03/2021 – 06/2021 — **Research stay**
Universitat de Barcelona, Barcelona – Spain
Topic: *Research in chemometrics, (MCR-ALS and data fusion) using spectroscopy (LIBS and Raman). Stay financed by the PhD scholarship program 'MOBLILEX 2020/21' promoted by the University of Lille (France)*
Supervisor: Prof. Anna de Juan Capdevila

Professional experience

2019 – 2021 — **Doctoral Teaching Assistant**
Université de Lille, Lille - France
Topic: *Assisting the main professor in the role of teacher to bachelor students in the courses of Optical physics and General chemistry (laboratory)*

2022 – Present — **Data scientist and chemometric expert in R&D**
IRIS Technology Solutions, Barcelona – Spain
Topic: *Working position in R&D department. Data analysis and development of outstanding spectroscopic methodologies (Raman, LIBS, vis-NIR, NIR and corresponding HSI technology) for various European projects (Horizon 2020 – RECOVER, Agro2Circular, MERLIN, PRESERVE, NanoPAT, REDOL, RECREATE) and private clients/facilities, as well as managing the projects.*

Spoken languages

Italian (native), English (C1), French (C1), Spanish (C1)

Journal publications (corresponding author underlined)

▪ P. Firmani, **A. Nardecchia**, F. Nocente, L. Gazza, F. Marini, A. Biancolillo, *Multi-block classification of Italian semolina based on Near Infrared Spectroscopy (NIR) analysis and alveographic indices*. Food Chem., 2020. https://doi.org/10.1016/j.foodchem.2019.125677

▪ **A. Nardecchia**, R. Presutto, R. Bucci, F. Marini, A. Biancolillo, *Authentication of the Geographical Origin of "Vallerano" Chestnut by Near Infrared Spectroscopy Coupled with Chemometrics*. Food Anal. Methods, 2020. https://doi.org/10.1007/s12161-020-01791-7

▪ **A. Nardecchia**, L. Duponchel, *Randomised SIMPLISMA: Using a dictionary of initial estimates for spectral unmixing in the framework of chemical imaging*. Talanta, 2020. https://doi.org/10.1016/j.talanta.2020.121024

▪ **A. Nardecchia**, C. Fabre, J. Cauzid, F. Pelascini, V. Motto-Ros, L. Duponchel, *Detection of minor compounds in complex mineral samples from millions of spectra: A new data analysis strategy in LIBS imaging*. Anal. Chim. Acta, 2020. https://doi.org/10.1016/j.aca.2020.04.005

▪ **A. Nardecchia**, R. Vitale, L. Duponchel, *Fusing spectral and spatial information with 2-D stationary wavelet transform (SWT 2-D) for a deeper exploration of spectroscopic images*. Talanta, 2021. https://doi.org/10.1016/j.talanta.2020.121835

▪ **A. Nardecchia**, V. Motto-Ros, L. Duponchel, Saturated signals in spectroscopic imaging: why and how should we deal with this regularly observable phenomenon? Anal. Chim. Acta, 2021. https://doi.org/10.1016/j.aca.2021.338389

▪ **A. Nardecchia**, A. de Juan, V. Motto-Ros, M. Gaft, L. Duponchel, *Data fusion of LIBS and PIL hyperspectral imaging: Understanding the luminescence phenomenon of a complex mineral sample*. Anal. Chim. Acta, 2022. https://doi.org/10.1016/j.aca.2021.339368

▪ **A. Nardecchia**, A. de Juan, V. Motto-Ros, C. Fabre, L. Duponchel, *LIBS and Raman image fusion: An original approach based on the use of chemometric methodologies*. Spectrochim. Acta Part B At. Spectrosc., 2022. https://doi.org/10.1016/j.sab.2022.106571

▪ **A. Nardecchia**, R. Vitale, E. Ziemons, L. Duponchel, *Improvement of pixel classification by the simultaneous use of spectral and spatial information in the framework of spectroscopic imaging*. Anal. Chim. Acta, 2023. https://doi.org/10.1016/j.aca.2023.340805

Oral communications (presenting author underlined)

▪ *Exploring hyperspectral imaging data sets with pixel resampling. The randomized SIMPLISMA approach*, L. Duponchel, A. Nardecchia, TIC 2019 (Topics In Chemometrics 2019), Szeged, Hungary (15-18/05/2019)

▪ *Randomised SIMPLISMA: facilitating rank evaluation and initial guesses generation in the framework of spectral unmixing and spectroscopic imaging*, A. Nardecchia, L. Duponchel, 10th COLLOQUIUM CHEMIOMERICUM MEDITERRANEUM, Menorca, Spain (12-14/06/2019)

▪ *Randomization as a wat to explore hyperspectral imaging data sets*, L. Duponchel, A. Nardecchia, 10th COLLOQUIUM CHEMOMETRICUM MEDITERRANEUM, Menorca, Spain (12-14/06/2019)

▪ *Chemometrics exploration in hyperspectral imaging in the framework of multimodality and big data*, A. Nardecchia, L. Duponchel, Journée des doctorants 2019, Lille, France (04/07/2019)

▪ *Imageries multiéchelles et multispectrales en fluorescence dans l'UV-visible et l'UV profonde pour le suivi des couches externs du grain de blé au cours du développement* (poster presentation), C. Alvarado, M.F. Devaux, A. L. Chateigner-Boutin, F. Guillon, L. Hélary, S. Durand, F. Jamme, A. Nardecchia, L. Duponchel, 9eme JST du RMUI (9e Journées Scientifiques et Techniques de Réseau des Microscopistes de l'Inra), Nantes, France (27-29/11/2019)

▪ *Spectral and spatial fusion: An interesting approach for classification in hyperspectral imaging*, A. Nardecchia, R. Vitale, L. Duponchel, e-Chimiométrie 2021, online conference due to COVID pandemic (2-3/02/2021)

▪ *Classification in NIR hyperspectral imaging: The importance of using both spectral and spatial information*, A. Nardecchia, R. Vitale, L. Duponchel, SWIIMS 2021 (Short Wave Infrared Imaging and Spectroscopy 2021), Amsterdam, Netherlands, online conference due to COVID pandemic (24-26/03/2021)

▪ *Chemometric methods and strategies for laser-induced breakdown spectroscopy (LIBS) hyperspectral images analysis: compression and data fusion*, A. Nardecchia, A. de Juan, V. Motto-Ros, M. Gaft, L. Duponchel, Road to CAC 2022 (Chemometrics in Analytical Chemistry 2021), online conference due to COVID pandemic (20-21/07/2021)

▪ *Compression and data fusion strategies for laser-induced breakdown spectroscopy (LIBS) and plasma induced luminescence (PIL) hyperspectral images*, A. Nardecchia, A. de Juan, V. Motto-Ros, M. Gaft, L. Duponchel, SCIX 2021 (SCIentific eXchange 2021), Providence, USA, online conference due to COVID pandemic (26/09-01/10/2021)

▪ *Saturated signals in LIBS imaging: why and how we should correct for these artifacts in the framework of multivariate analysis?*, L. Duponchel, A. Nardecchia, V. Motto-Ros, SCIX 2021 (SCIentific eXchange 2021), Providence, USA, online conference due to COVID pandemic (26/09-01/10/2021)

▪ *Compression and data fusion in the framework of hyperspectral LIBS imaging*, A. Nardecchia, A. de Juan, V. Motto-Ros, M. Gaft, L. Duponchel, EMSLIBS 2021 (Euro-Mediterranean Symposium of Laser-Induced Breakdown Spectroscopy 2021), Gijón, Spain (29/11-02/12/21)

▪ *Saturated signals in LIBS imaging: why and how we should correct for these artifacts in the framework of multivariate analysis?* L. Duponchel, A. Nardecchia, V. Motto-Ros, EMSLIBS 2021 (Euro-Mediterranean Symposium of Laser-Induced Breakdown Spectroscopy 2021), Gijón, Spain (29/11-02/12/21)

▪ *Pilot scale ex and in situ degradation of municipal and rural APW: Inline monitoring disintegration and non-degraded plastic*, A. Nardecchia, RECOVER's 24M General Assembly (Horizon 2020 project), Orihuela, Spain (22-23/06/2022)

▪ *A2C technologies for the sorting and recycling of multilayer plastics residues: Optical sorting of the multilayer materials*, A. Nardecchia, Agro2Circular's 22M General Assembly (Horizon 2020 project), Murcia, Spain (18-19/10/2022)

▪ *Pilot scale ex and in situ degradation of municipal and rural APW: Inline monitoring disintegration and non-degraded plastic*, A. Nardecchia, RECOVER's 30M General Assembly (Horizon 2020 project), Ghent, Belgium (28-29/11/2022)

▪ *Biodegradation, compostability and materials recycling: Protocols to detect automatically the different PRESERVE materials*, A. Nardecchia, PRESERVE's 24M General Assembly (Horizon 2020 project), Valencia, Spain (14-15/02/2023)

▪ *A2C technologies for the sorting and recycling of multilayer plastics residues: Optical sorting of the multilayer materials*, A. Nardecchia, Agro2Circular's 28M General Assembly (Horizon 2020 project), online meeting (18-19/4/2023)

▪ *Pilot scale ex and in situ degradation of municipal and rural APW: Inline monitoring disintegration and non-degraded plastic*, A. Nardecchia, RECOVER's 36M General Assembly (Horizon 2020 project), Pisa, Italy (26-27/06/2023)

▪ *Biodegradation, compostability and materials recycling: Protocols to detect automatically the different PRESERVE materials*, A. Nardecchia, PRESERVE's 30M General Assembly (Horizon 2020 project), Florence, Italy (4-5/07/2023)

▪ *Pilot scale ex and in situ degradation of municipal and rural APW: Inline monitoring disintegration and non-degraded plastic*, A. Nardecchia, RECOVER's 42M General Assembly (Horizon 2020 project), Naple, Italy (23-24/06/2023)

▪ *A2C technologies for the sorting and recycling of multilayer plastics residues: Optical sorting of the multilayer materials*, A. Nardecchia, Agro2Circular's 40M General Assembly (Horizon 2020 project), online meeting (12-13/03/2024)

▪ *Biodegradation, compostability and materials recycling: Protocols to detect automatically the different PRESERVE materials*, A. Nardecchia, PRESERVE's 36M General Assembly (Horizon 2020 project), Gent, Belgium (17-18/01/2024)

▪ *Aragon's REgional Hub for circularity: Demonstration Of Local industrial urban symbiosis initiatives*, A. Nardecchia, REDOL's 24M General Assembly (Horizon 2020 project), online meeting (5-6/05/2024)

▪ *Increasing the quality and rate of multilayer packaging recycling waste: Automated sorting system for multi-layer material sorting*, A. Nardecchia, MERLIN's 30M General Assembly (Horizon 2020 project), Brussels, Belgium (29/05/2024)

▪ *Biodegradation, compostability and materials recycling: Protocols to detect automatically the different PRESERVE materials*, A. Nardecchia, PRESERVE's 42M General Assembly (Horizon 2020 project), Munich, Germany (17-18/07/2024)

▪ *A2C technologies for the sorting and recycling of multilayer plastics residues: Optical sorting of the multilayer materials*, A. Nardecchia, Agro2Circular's 48M General Assembly (Horizon 2020 project), online meeting (5-6/11/2024)

To whom it may concern,

I am writing this presentation letter to apply for this position. My name is Alessandro Nardecchia. I was born in Rome, Italy, and during my studies I focused my interest in chemistry, which soon has become the centre of my professional career path. At first, I started a Bachelor in Chemistry at the University "Tor Vergata" (Rome - Italy). Thanks to this choice I could deepen my knowledge in the different branches of chemistry and, particularly, thanks to the internship I carried out to get the Bachelor title, I could use various analysis techniques (*i.e.*, Raman, XRD, SEM, FT-IR/ATR and voltammetric techniques) working in the cultural heritages field, collaborating with the International Centre for the Preservation and Restoration of Cultural Property of Rome (ICCROM).

After this first experience, I decided to go on with my studies focusing in the field of analytical chemistry. This is the reason why, after finishing the Bachelor, I moved to the University of Rome "La Sapienza" to obtain my Master in Analytical Chemistry. Here, I learnt about various instrumentations, fields of application to chemical analysis and in particular, I first heard about chemometrics, which immediately caught my attention. Chemometrics is a recent and outstanding branch of chemistry (which can be applied to data analysis) that is becoming more and more every day an essential solution to face various challenges that can be encountered in different fields of research. This is the reason why I have chosen to deepen this subject and prepare my final dissertation on it. Furthermore, I felt the necessity of challenging my limits, the reason why I decided to go abroad during my academic formation, preparing my thesis work in the Copenhagen University (Denmark), where I was part of a very international and active group of research. Here I could practice in the use of laboratory procedures, sample preparation and data analysis in the fields of foodomics and metabolomics applying chemometrics using various instruments to acquire the data (mainly GC/MS and ICP). Once I came back to Italy, I finally obtained my Master title, rewarded with an Honours Degree because my project stood out from others.

My first experience abroad opened my mind both from a personal and professional point of view. The possibility of living in a different environment, improving my English, working surrounded by a very international and professional team and many more reasons made me want to repeat my experience. In fact, immediately after I finished my Master I applied for the scholarship "Torno Subito" promoted by RegioneLazio (Rome - Italy) and in 2018 I came back to Copenhagen where I joined for a longer period the same group, keeping working on the projects I have started during my first stay, starting new ones and participating in some courses offered me by the university to improve my skills in chemometrics and the use of MATLAB (one of the main software used in chemometrics). Eventually, I finished this scholarship in Rome, where I had to spend the second part of it, working on the draft of two papers related to my projects and deepen my skills in spectroscopy, particularly in NIR.

Finally, also following the advice of my previous supervisors, in 2019 I started my doctorate in Analytical Chemistry and Chemometrics in Lille, France. Here I started dealing with spectroscopy and particularly with hyperspectral imaging (the main subject of my PhD), an outstanding technique which represents without any doubt the future of research and industry analysis. Without the need for words, this step has been one of the most important of my life. Doing a PhD means working on a specific project for years, facing various challenges, but also growing professionally finding various solutions to the possible problems of conducting scientific research. During my period here I was surrounded by an incredible international environment made of some of the maximum experts in chemometrics and spectroscopy and of many colleagues from different parts of the world, giving me the possibility of not only working on my project, but also joining the ones of others to improve my knowledge and capability of problem solving. Additionally, I could learn French and I had the possibility of tutoring bachelor students as a teacher assistant in different university courses (in my opinion, a fundamental step for a PhD candidate) to refine my skills and experience. Also, I had the chance to collaborate with the group of DISCO in the French Synchrotron, namely the SOLEIL, which is clearly a very unique and great opportunity during a doctorate, conducting some data acquisition using very specific instruments. I cannot complain about my general experience, but on the other hand, my PhD has been made more complicated by COVID-19 pandemic, which clearly affected all of us. Due to it, carrying out my research has been more challenging, due to the fact that I lost precious time. In the same way, this period has been the fault of why I could not physically participate at many congresses which should be a central part of a doctorate to show and share one's own research to all the scientific community, expanding also the professional connections. This is one of the reasons why, as soon as it has been possible, I decided to apply for MOBLILEX scholarship, to take advantage of, in the best possible way, the last part of my doctorate exploring new possibilities working in another group of research moving (again) abroad. I decided to join for four months the group of chemometrics at the Universitat de Barcelona (Spain), driven by the fact that I knew already the chief

of the group (Prof. Anna de Juan) and that I was interested in her line of research and her international success. Despite the short period, this has been a fruitful one, allowing me to meet a very proactive group of students with whom I immediately started an exchange of ideas and information, comparing our projects. From a general point of view, I am really satisfied with my PhD, also thanks to the fact that I could publish during the whole doctorate various papers in different journals. It has been a period full of many experiences, very formative from a personal and professional point of view. Naturally, the possibility of spending a period abroad has been one of the most important moments during my path and I am very thankful that I got this opportunity. Eventually, the thesis defence has been the perfect end to this whole period, describing to a very heterogeneous and international jury my work in a professional way, showing to everyone the development of my project and personal growth since the start of my PhD up to the end.

Today, after the end of my doctorate, I am part of an outstanding and modern corporation in Barcelona (IRIS Technology Solutions) where I am working in the R&D department as chemometrician and data analyst, as an expert in hyperspectral imaging, the main subject of my PhD project. I am very satisfied with my position in which I am rapidly improving my skills, getting an increasingly relevant role within the company, training and leading my collaborators, sharing with them what I learnt during my years of studies in chemometrics. Working for both private and European projects (Horizon 2020) is a very satisfying aspect of my position in IRIS, which allows me to apply what I was performing during my PhD, becoming constantly more competent in new aspects of being a data analyst and learning how to manage projects.

In conclusion, I believe that my academic and professional achievements are a clear demonstration of my abilities and devotion to science and research. During my career I could work in various environments and situations, showing a good adaptability and ability in fast learning. I always exhibited a good attitude in working toward team and autonomy, also leading groups of people if necessary, sharing my knowledge and teaching what I know to the rest of the group. The fact of simultaneously dealing in the routine with different projects is a demonstration of my good organization, as well as the predisposition to pursue and achieve the targets set within a certain deadline. Last but not least, I had to deal often with challenges, showing a good ability in the resolution of problems, as well as resilience during stressing periods.

Despite my current position, which I find interesting and full of possibilities, I am now searching for something more challenging. I feel the desire for a big change in my career path that could help me not only to grow in what I am already doing daily, but also and particularly that could give me new perspectives. I would be thrilled to work in a new organization with new responsibilities and possibilities in my career path, extending my competences. This is why I am now applying for this position, which fits my ambitions and hunger for knowledge in an interesting company like yours.

Sincerely,

Alessandro Nardecchia