



Ilaria Serafini

Marie Skłodowska-Curie Global Fellow, Sapienza University of Rome (Italy)/ Smithsonian Institution (USA)
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Work experience

NATIONAL SCIENTIFIC QUALIFICATION AS ASSOCIATE PROFESSOR - DISCIPLINARY FIELD OF 03/A1 - ANALYTICAL CHEMISTRY. 11TH DECEMBER 2023- 11TH DECEMBER 2034

Achieved the National Scientific qualification as associate professor in the Italian higher education system, in the call 2021/2023 (Ministerial Decree n. 553/2021 and 589/2021) for the disciplinary field of 03/A1 - Analytical chemistry. (Academic Recruitment Field 03/A - Analytical and physical chemistry, according to the national classification).

MARIE SKŁODOWSKA-CURIE RESEARCH FELLOW, GLOBAL FELLOWSHIPS, HORIZON 2020 CALL (H2020-MSCA-IF-2020) - SAPIENZA UNIVERSITY OF ROME -ITALY, SMITHSONIAN INSTITUTION - USA, 1ST FEBRUARY 2022 - 31ST JANUARY 2025

Research Fellow under the MSCA program, Horizon 2020 Call (H2020-MSCA-IF-2020), with a project titled "PARCA-Advance in Proteomics and Analysis of dyes and Recovery of Charred and Aged textiles".

The project starts from the consideration that analysis of archaeological textiles is a challenging undertaking. These precious remains have been altered to the point that discerning their composition requires the development of high specialised analytical tools, characterized by high sensitivity and great versatility. In different sites, many textiles have been excavated, some well-preserved, some with signs of carbonisation; in some cases, traces of colour are still visible. PARCA project proposes to join forces between dye analysis and proteomics to develop an innovative streamlined protocol that would combine dye and protein analysis in a single extraction to minimise sampling size while maximising the amount of information obtained. It will be achieved through the most up-to-date methodologies and instrumental developments of Liquid Chromatography-Orbitrap-Mass Spectrometry to develop protocols that will be applicable to the most degraded archaeological textiles. The LC-MS data will be correlated with FTIR and SEM analyses, to determine the threshold of protein survival by non-destructive techniques prior to proteomics. The project will be carried out for the first 2 years at the Smithsonian Institution (Washington DC-USA), in the proteomics lab under the supervision of Dr. Caroline Solazzo, Dr. Timothy P. Cleland and Dr. Gwénaëlle M. Kavich. The third year, incoming phase, will be carried at Sapienza University of Rome, under the supervision of Prof. Roberta Curini and Prof. Gabriele Favero. At the end, archaeological relics from the Mediterranean basin will be analysed, in particular samples from Pompeii and Vesuvian areas and from Greek areas.

FOUNDER OF UNIVERSITY START UP "D-ART SRL" - 6TH JULY 2020 - TODAY

The start-up D-ART srl is a university start-up born within Sapienza. It is aimed at providing diagnostic-analytical services in the field of cultural heritage, from the

characterization of materials, to the assessment of the state of conservation of the work of art up to the analysis of authenticity, fundamental for the conservation and protection of the artworks. This service consists of the drafting of an organic diagnostic project and planning related analyses, to be carried out in collaboration with various Sapienza partners. In addition, the Start Up also offers development and testing services for specific products and materials for conservation and restoration. The characteristic approach consists of problem solving and research, aimed specifically at satisfying customer requests. Furthermore, the Start Up provides multi-technical analysis services for highly complex matrices belonging to other fields, such as for example the agri-food, cosmetic and pharmaceutical ones.

RESEARCH FELLOW, DEPARTMENT OF CHEMISTRY AND TECHNOLOGY OF DRUG / DEPARTMENT OF CHEMISTRY, UNIVERSITY OF ROME "LA SAPIENZA", ROME, ITALY - 1ST JULY 2018 - 30TH JUNE 2021

Research Fellow with a project titled "Development of analytical methods for the identification of diagnostic markers in complex matrices of natural origin applied to the cultural heritage sector", under the Scientific supervision of Prof. Roberta Curini - full professor, chief of the laboratory of mass spectrometry- Department of Chemistry. The project was based on the research project already started during the scientific goer period, looking at extraction and characterization of diagnostic marker from natural dyes from artwork materials. This project had being focused the attention to the application of innovative pre-treatment and concentration methods for the cultural heritage field, in order to characterize the dyes composition in LC-MS. Employed techniques: mass spectrometry, chromatographic separation and HPLC-MS analyses.

Together with this, the research on a multi analytical approach on contemporary art material and synthetic dyes was performed, in order to identify their chemical composition and evaluate the state of conservation.

Part of this research fellowship was also, taking into account the advance in the nanomaterial knowledge, the developed of a new nanocomposite material in the field of cosmetics and pharmaceuticals, which is currently patented.

In the field of cosmetics and pharmaceuticals, during the fellowship the development of a new system for the characterization of tattoo ink, in collaboration with Azienda Ospedaliera "Sant'Andrea" in Rome, Il Policlinico had been investigated.

GUEST EDITOR, SPECIAL ISSUE "NATURAL DYES" (IF 3.098) OF THE JOURNAL "MOLECULES" (I.F. 3.098) - OCTOBER 2018- MAY 2020

Guest Editors for the Special Issue "Natural Dyes" of the journal "Molecules" (<http://www.mdpi.com/journal/molecules>). As Editor, it should consider and evaluate the submission of previously unpublished manuscripts (original researches or reviews)

detailing current research concerning the natural dyes. Examples of these studies may include: Natural dyes in cultural heritage, cosmetics, pharmaceuticals and foods.

LECTURER, ICPAL, ROME (ITALY) – MARCH 2015- SEPTEMBER 2021

Lecturer of General and Inorganic Chemistry from 2014-2015 academic year until September 2021 at "Istituto Centrale per la Patologia degli Archivi e del Libro", Rome. The course aims to provide the basic concepts of general and inorganic chemistry, from a theoretical point of view and illustrated through laboratory exercises, to the restorers trained by the Institute, with a particular attention to the main problematics referable to the application of chemistry to paper conservation.

EDITORIAL OFFICE , JOURNAL OF NATURAL PRODUCT RESEARCH (TAYLOR & FRANCIS GROUP) – MARCH 2016- JANUARY 2022

As a member of the editorial office of the scientific journal "Journal of Natural Product Research" - Taylor & Francis group, the position occupied requires an initial assessment of the innovation of the research and to check the suitability of the content and form of the submitted article before passing it to the editor's screen.

TUTOR OF GENERAL AND INORGANIC CHEMISTRY, ENGINEERING DEPARTMENT, UNIVERSITY OF ROMA TRE – MARCH - JUNE 2019/2020

Tutor for the course of General and Inorganic Chemistry from 2018-2019 academic year until 2019-2020 academic year at Engineering Department. The tutor activities mainly consist in supporting students in acquiring the basic concepts of general and inorganic chemistry. This goal has been achieved with short theoretical lessons, which recalled the topic covered during the lessons, and guiding them in the resolution of exercises.

LECTURER AT POST GRADUATION COURSE IN NATURAL ORGANIC SUBSTANCES, DEPARTMENT OF CHEMISTRY, SAPIENZA UNIVERSITY OF ROME – MARCH 2015-2016-2017-2018

The high specialization post graduation course, held by Prof. Armandodoriano Bianco, was focusing on the different aspect of organic chemistry concerning natural substances. The lessons held during the course was focusing on: natural dyes, extraction protocol and characterization through HPLC-MS analyses.

AUXILIARY – 19 NOVEMBER 2017

Auxiliary for performing non-invasive chemical physics analysis, by reflection micro-spectrophotometry, as a technical advisor nominated by the "Procura della Repubblica" (public prosecutor's office) at the Court of Rome.

SCIENTIFIC GOER, CHEMISTRY DEPARTMENT, UNIVERSITY OF ROME "LA SAPIENZA", ROME, ITALY – MARCH 2016- JUNE 2018

Scientific goer, supporting the research activity of the group "Natural Organic Substances" - Department of Chemistry, in several research projects, such as:

- extraction and characterization of natural dyes from artwork materials, with particular attention to historical tapestries and cellulosic materials (Employed techniques: NMR, mass spectrometry, chromatographic separation and HPLC-MS analyses, spectrophotometry and FTIR analyses, accelerating aging process);
- Development and evaluation of nano composite product for the consolidation of historical tapestries and cellulosic materials (Employed techniques: tensile tests, colorimetry measurements, AFM, FTIR analyses, accelerating aging process, FEG-SEM analyses);
- Isolation and identification of synthetic dyes produced by ACNA (Azienda Coloranti Nazionali e Affini) industries during the 60s-80s (Employed techniques: NMR, SERS analyses, Raman analyses, mass spectrometry, chromatographic separation and HPLC-MS analyses);
- Isolation and characterization of tattoo ink, for the evaluation of the health risk, in collaboration with Azienda Ospedaliera "Sant'Andrea" in Rome, Il Policlinico;
- Development of innovative systems for the identification of trace compounds in food products;
- Isolation and characterization of secondary metabolites in plant matrices (Employed techniques: NMR, mass spectrometry, chromatographic separation and HPLC-MS analyses);

CONSERVATION SCIENTIST, MAYA DEVI TEMPLE, LUMBINI (NEPAL), 1-28 FEBRUARY 2012

Conservation Scientist, aimed at studying the mechanisms of degradation of archaeological remains (mainly masonry) in the Maya Devi temple in Lumbini (Nepal) and analysis of microclimatic data. The activity was part of the internships for the Master's degree, within the UNESCO project "Strengthening the Conservation and Management of Lumbini, the Birthplace of Lord Buddha", under the direction of the UNESCO office in Kathmandu and UNESCO consultant dr. Meucci.

ASSISTANT- ERASMUS OFFICE, UNIVERSITY OF ROME "LA SAPIENZA", FEBRUARY 2010 - DECEMBER 2011

Assistant in the Erasmus office, aimed at supporting administrative functions as a winner of a scholarship (contact with the Erasmus offices of other foreign universities to coordinate and follow the students in the development of the necessary practices; collaboration in evaluating the applications received and conversion of the marks and

examinations). The work was assessed for the academic year 2010-2011 in the Erasmus Office of the "Charles Darwin" Biology Department and for the academic year 2009-2010 in the Erasmus Office of the Informatics Department, both in University of Rome "Sapienza".

ASSISTANT- STUDENT OFFICE, UNIVERSITY OF ROME "LA SAPIENZA", APRIL 2009-NOVEMBER 2009

Assistant in the Student office in the Chemistry Department of University of Rome "La Sapienza", aimed at supporting administrative functions as a winner of a scholarship.

SERVICES OF RECEPTION AND MANAGEMENT OF THE PUBLIC- 13TH FINA WORLD CHAMPIONSHIPS, ROME (ITALY), JUNE 2009-JULY 2009

Volunteer team in charge of controlling access to stadiums and reception services to spectators during the 13th FINA World Championships. The main activities were the reception services and coordination of small groups.

Education

1ST HRMS SCHOOL - SCI - ITALIAN CHEMISTRY SOCIETY (MASS SPECTROMETRY DIVISION) – UNIVERSITY OF SALERNO, ITALY, DECEMBER 2019

1st HRMS School - 1° School of High Resolution Mass Spectrometry. The school was focused on theoretical training on the principles of mass spectrometry in high resolution. It had a practical session based on acquisition of mass and tandem mass spectra with FT-ICR MS (Solarix XR 7T) and LTQ Orbitrap XL MS coupled with a UHPLC system, together with a part for the processing and interpretation of the analytical data acquired, from a qualitative-quantitative point of view.

UNIVERSITY OF ROME "LA SAPIENZA" – PHD IN EARTH SCIENCE, CURRICULUM "SCIENCE FOR ENVIRONMENTAL PROTECTION AND CULTURAL HERITAGE", 21ST FEBRUARY 2017

PhD Title obtained at the University of Rome "La Sapienza", Department of Earth Science, Doctoral School "Vito Volterra" with a thesis "Advanced analytical and conservation methods in Cultural Heritage, towards the development of a new nanomaterial for textile manufactures ", (SSD CHIM / 012) under the supervision of Prof. Armandodoriano Bianco.

Rating: Ottimo con lode / very good *cum laude*

Purpose and topics covered in the PhD project: The purpose was the development of a new nano material for the restoration and conservation of tapestries and textile manufactures in general. To achieve this, it was necessary to start from the knowledge and characterization of the materials constituting the work of art: yarns and natural dyes. Within these activities, a new soft extraction method was developed for the dyed yarns and lake pigments. Once qualitatively characterized, the two matrices (yarns and

dyes) had been observed from the point of view of degradation mechanisms, through accelerated aging experiments, characterizing the modified chemical-physical properties. This allowed to evaluate the interaction with the new restoration product, in order to confirm its effectiveness as consolidant material, from the point of view of increasing tensile properties and resistance against UV radiation (and photo-oxidation process). The main techniques used were NMR-mono- and bi-dimensional, HPLC-MS and ESI-MS, microspectrophotometry for dye characterization; mechanical resistance tests (DMA), FEG-SEM, microspectrophotometry and FTIR spectroscopy for the evaluation of mechanical properties of aging fibers and their monitoring during artificial aging. All of the techniques indicated have been used for evaluation performance of the consolidating nanotechnology.

Within the activities of PhD school, the following schools has been followed:

- February 2016 " International Winter School "molecules@surfaces"- organized by SCI- Society Chimica Italiana - divisione di chimica-fisica (Italian Chemical Society- Physical-Chemistry Division)- Bardonecchia (Turin-Italy)
- October 2015- three seminar on 1D and 2D NMR Two-dimensional Spectroscopy experiments, titled "Homonuclear through-bond correlation methods: COSY and TOCSY"; "Heteronuclear single-quantum and multiple-bond correlation spectroscopy (HMBC, HSQC, HETCOR, HSQC-TOCSY)"; "Through-space correlation methods (NOE, NOESY, ROESY, DOSY)", hold by Dr. Fabio Sciubba, Chemistry Department, University of Rome "La Sapienza", Rome (Italy)
- March 2014- October 2015 - Training for the use of Bruker NMR spectroscope, Chemistry Department, University of Rome "La Sapienza", Rome (Italy)
- March 2014- June 2014 - Physical methodology in organic chemistry, hold by Prof. Andrea D'Annibale, course of the Master Degree in Chemistry, Chemistry Department, University of Rome "La Sapienza", Rome (Italy)
- March 2014- June 2014- "How to write a scientific paper", hold by Prof. Maurizio Battaglia, course of the PhD school, Health Science Department, University of Rome "La Sapienza", Rome (Italy)
- March 2014- June 2014- "Numerical Calculation", hold by Prof. Maurizio Battaglia, course of the PhD school, Health Science Department, University of Rome "La Sapienza", Rome (Italy)

- September 2014- National school of Analytical Chemistry for PhD student, organized by SCI- Society Chimica Italiana - Divisione di Chimica Analitica (Italian Chemical Society- Analytical Chemistry Division)- Rome (Italy)
- April 2014- 18th Course of Mass Spectrometry, organized by SCI- Society Chimica Italiana - Divisione di Spettrometria di Massa (Italian Chemical Society- Mass Spectrometry Division)- Siena (Italy)

INTERNATIONAL LANGUAGE SCHOOLS OF CANADA (ILSC), VANCOUVER (BC)

Canada IELTS certificate; Certificate of Attendance and level reached (C1- Advanced-proficiency). Main courses followed: Academic Preparation, Academic Speaking and Listening, Business Writing Skills

UNIVERSITY OF ROME "LA SAPIENZA" – MASTER DEGREE IN SCIENCE AND TECHNOLOGY FOR THE CONSERVATION OF CULTURAL HERITAGE (MAJOR: CHEMICAL- PHYSICS), JANUARY 2013

Master Degree Title obtained at the University of Rome "La Sapienza", with a thesis "Lumbini, the birthplace of Lord Buddha. Studies for the conservation of the Sacred Garden, archaeological remains: microclimate and degradation processes",

Final Degree: 110/110 *cum laude*

Purpose and topics covered in the Master Degree project: the thesis project aimed at studying the mechanisms of degradation of archaeological remains (mainly masonry) in the Maya Devi temple in Lumbini (Nepal). The study was part of the UNESCO project entitled "Strengthening the Conservation and Management of Lumbini, the Birthplace of Lord Buddha", under the scientific supervision of Prof. Costantino Meucci. The experimental work was developed in two phases. The preliminary phase was carried out *in situ* by direct observation and analysis on archaeological remains, focusing on the best methodologies to identify the critical points of the structure, in which degradation was more incident. In this context, the presence of an aquifers stratum under the archaeological remains had been identified as one of the most important causes of the degradation due to salt and other factors dependent on it. Our goal was the qualitative and quantitative determination of salts by means of *in situ* extraction, using Japanese paper according to the methodology suggested by Prof. Sammartino (researcher at the University of Rome "Sapienza") and the subsequent determination in the salt concentration laboratory by ion chromatography. The concentration of salts inside the masonry was also evaluated through a series of drillings at different heights and depths, in order to define the trend of salt distribution within the masonry itself. At the same time, the acquisition of microclimatic data with an automatic system allowed

to compare all the information and to clearly define the mechanisms of degradation. Thus, the thesis provided an overview of the conservation status of archaeological remains within the Maya Devi temple, not only by highlighting the active degradation mechanisms but also the geological and hydrogeological impact on the long-term conservation of the site.

UNIVERSITY OF ROME "LA SAPIENZA"/STUDIO MEUCCI – INTERNSHIP, JANUARY 2011 - JANUARY 2013

Internship based on the development and assessment of chemical-physical analyses for the evaluation of degradation mechanisms of Maya Devi Temple, Lumbini (Nepal)

UNIVERSITY OF ROME "LA SAPIENZA" – BACHELOR DEGREE IN SCIENCES APPLIED TO CULTURAL HERITAGE AND DIAGNOSTICS FOR THEIR CONSERVATION, DECEMBER 2011

Bachelor Degree Title obtained at the University of Rome "La Sapienza", with a thesis "The New Paintings of the Tullianum: Comparative Study of the Painted Layers",

Final Degree: 110/110 cum laude

Purpose and topics covered in the Bachelor's project: The thesis was focused on the application of diagnostic analyses on the different painted layers, wall paintings, brought to light during the restoration work in the Mamertino Prison, in the archaeological area of Rome, is a diagnostic research on the various wall paintings brought to light during the restoration work. The paintings, on the right wall of the upper room, were initially covered by a lime layer. The study of the stratigraphy in fact, confirmed the presence of several painters layers, relating to different periods. During the work, therefore, the pigments and the techniques used to realize the paintings were identified, mainly composed by a most ancient layer realized with frescoes technique, with the adding of cinnabar and other alkaline-sensible pigments in a second moment, and the most recent layers with tempera technique. The work, carried out in collaboration with the Archaeological Superintendence of Rome, was then articulated in a diagnostic investigation that used non-destructive analyzes such as UV fluorescence, IR photography and colorimetry, up to micro-destructive investigations (petrographic and SEM-EDS observations) on some samples taken in different points in the paintings.

LICEO GINNASIO STATALE AUGUSTO, DIPLOMA DI MATURITÀ CLASSICA- HIGH SCHOOL CERTIFICATION IN CLASSICAL SUBJECTS, JULY 2007

Final Degree: 99/100

Technical skills

Skills and technical skills Instrumentation employed in the Research Group and through collaborations with other groups:

- NMR (mono and two-dimensional experiments such as COSY, TOCSY, DOSY, HSQC, HMBC, etc.) with Bruker Avance III 400 spectrometer;
- Mass spectrometry (Micromass Q-TOF MICRO spectrophotometer equipped with ESI Z spray)
- Chromatographic methods (chromatographic columns, HPTLC-MS -CAMAG system) and HPLC-MS such as:
 - HPLC-Series 200 Micro-LC Pump System with Perkin Elmer Autoplayer, interfaced to a triple quadrupole API 2000 of AB-Sciex, equipped with a Turbo Ion-Spray source;
 - HPLC-HRMS with a ThermoScientific Ultimate 3000 RSLC system coupled with Thermo Scientific Q Exactive Spectrometer
- Electronic microscopy with FEG-SEM Zeiss UltraPlus
- UV-Vis spectrophotometry with BWTEK Exemplar® LS
- Raman and FTIR spectroscopy with Horiba Jobin-Yvon HR Evolution microRaman and JASCO FTIR 410, respectively
- DMA with DMA Q800 instrument -TA Instruments
- Aging rooms with QUV-Lab.

Personal skills

ENGLISH ABILITIES:

Comprehension: Listening (C1) Reading (C2)

Spoken: Oral Production (C1)

Written Production: (C1)

FRENCH ABILITIES

Comprehension: Listening (B1) Reading (B2)

Spoken: Oral Production (A1)

Written Production: (A2)

Levels: A1/2 Base - B1/2 Intermediate - C1/2 Advanced

General Skills:

- Able to use of Office Package, Photoshop, Linux (Ubuntu), Windows (XP, Vista) and Mac operating systems;
- Able to organize teams and coordinating activities in chemical laboratory, thanks to the activity of Tutor, inside the Chemistry Department, aimed at following the students for their Bachelor and Master degree in chemistry;
- Able to coordinate and support students and manage collaboration among different universities
- Easily adaptable to new culture and high intercultural awareness

Honours, Awards and Achievements

- Received University Cancellor's honours in graduation class;
- Best Poster Presentation in CMA4H Mediterranean Meeting with "Methodology for the identification of organic dyes used in tapestries" (Ilaria Serafini et al.,)

Publications

ACCEPTED- IN PRESS

[P_01] Alessandro Ciccola, Flaminia Vincenti, Roberta Curini, Kathryn Raeburn McClure, Ilaria Serafini, Camilla Montesano, Alessandra Gentili, Gabriele Favero, Paolo Postorino, The 20th century and its new colours: Investigating the molecular structures of historical synthetic dyes using Raman spectroscopy, *Journal of Raman spectroscopy*, 2023;1-12.

[P_02] Flaminia Vincenti, Camilla Montesano, Alessandro Ciccola, Ilaria Serafini, Gabriele Favero, Matteo Pallotta, Gaia Di Francesco, Martina Croce, Flavia Pagano

Maria Laura Leone, Italo Maria Muntoni, Manuel Sergi, Unearthed opium: development of a UHPLC-MS/MS method for the determination of *Papaver somniferum* alkaloids in Daunian vessels, *Frontiers in Chemistry*, 2023, 11:1238793.

[P_03] Ilaria Serafini, Greta Peruzzi, Kathryn Raeburn McClure, Alessandro Ciccola, Flaminia Vincenti, Adele Bosi, Camilla Montesano, Manuel Sergi, Gabriele Favero, Roberta Curini, Inside the History of Italian Coloring Industries: An Investigation of ACNA Dyes through a Novel Analytical Protocol for Synthetic Dye Extraction and Characterization, *Molecules*, 2023, 28, 5331

[P_04] Greta Peruzzi, Alessandro Ciccola, Adele Bosi, Ilaria Serafini, Martina Negozio, Nagmeldeen Morshed Hamza, Claudia Moricca, Laura Sadori, Gabriele Favero, Valentina Nigro, Paolo Postorino, Roberta Curini, Applying Gel-Supported Liquid Extraction to Tutankhamun's Textiles for the Identification of Ancient Colorants: A Case Study, *Gels*, 2023, 9, 514. <https://doi.org/10.3390/gels9070514>

[P_05] Adele Bosi, Alessandro Ciccola, Ilaria Serafini, Greta Peruzzi, Valentina Nigro, Paolo Postorino, Roberta Curini, Gabriele Favero, Gel microextraction from hydrophilic paint layers: A comparison between Agar-gel and Nanorestore Gel® HWR for spectroscopic identification of madder, *Microchemical Journal*, 2023, 187, 108447

[P_06] Zeynep Alp, Alessandro Ciccola, Ilaria Serafini, Alessandro Nucara, Paolo Postorino, Alessandra Gentili, Roberta Curini, Gabriele Favero, Photons for Photography: A First Diagnostic Approach to Polaroid Emulsion Transfer on Paper in Paolo Gioli's Artworks, *Molecules*, 2022, 27, 7023. <https://doi.org/10.3390/molecules27207023>

[P_07] Claudio Frezza, Gianluca Bozzato, Fabio Sciubba, Ilaria Serafini, Marco Franceschin, Roberta Curini, Kevin Cianfaglione, Alessandro Venditti, Armandodoriano Bianco, Mauro Serafini, Sebastiano Foddai, Phytochemical analysis on the aerial parts of *Teucrium capitatum* L. with aspects of chemosystematics and ethnobotany, *Natural Product Research*, 2022, DOI: 10.1080/14786419.2022.2081967

[P_08] Alessandro Ciccola, Ilaria Serafini, Giorgio Mori, Roberta Curini, Paolo Postorino, Laura Medeghini, Gabriele Favero, A whiter shade of vase: discovering the white colors of an ancient Apulian krater through XRPD and Raman spectroscopy, *Scientific Culture*, 2022, 8 (2), 37-45

[P_09] Alessandro Ciccola, Ilaria Serafini, Giulia D'Agostino, Belinda Giambra, Adele Bosi, Francesca Ripanti, Alessandro Nucara, Paolo Postorino, Roberta Curini, Maurizio

Bruno, "Dyes of a shadow theatre: Investigating tholu bommalu indian puppets through a highly sensitive multi-spectroscopic approach", *Heritage*, 2021, 4, 1807-1820. <https://doi.org/10.3390/heritage4030101>

[P_10] Claudia Colantonio, Luca Lanteri, Alessandro Ciccola, Ilaria Serafini, Paolo Postorino, Erminia Censorii, Doinita Rotari, Claudia Pelosi, *Imaging Diagnostics Coupled with Non-Invasive and Micro-Invasive Analyses for the Restoration of Ethnographic Artifacts from French Polynesia*, *Heritage*, 2022, 5, 215-232. <https://doi.org/10.3390/heritage5010012>

[P_11] Marco Galli, Francesca Coletti, Alessandro Ciccola, Ilaria Serafini, "Archeologia e Archeometria del tessuto antico: un gruppo di manufatti aurei dall'area vesuviana (Pompei, Ercolano, Oplontis)", *Scienze dell'Antichità*, Sapienza Università degli Studi di Roma, Dipartimento di Scienze dell'Antichità, 26.1, 2020

[P_12] Alessandro Ciccola, Ilaria Serafini, Francesca Ripanti, Flaminia Vincenti, Francesca Coletti, Armandodoriano Bianco, Claudia Fasolato, Camilla Montesano, Marco Galli, Roberta Curini, Paolo Postorino, "Dyes from the Ashes: Discovering and Characterizing Natural Dyes from Mineralized Textiles", *Molecules* 2020, 25, 1417; [doi:10.3390/molecules25061417](https://doi.org/10.3390/molecules25061417).

[P_13] Adele Bosi, Alessandro Ciccola, Ilaria Serafini, Marcella Guiso, Francesca Ripanti, Paolo Postorino, Roberta Curini, Armandodoriano Bianco, "Street art graffiti: Discovering their composition and alteration by FTIR and micro-Raman spectroscopy", *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy* 225 (2020) 117474.

[P_14] Giulia Germinario, Alessandro Ciccola, Ilaria Serafini, Ludovica Ruggiero, Marco Sbroscia, Flaminia Vincenti, Claudia Fasolato, Roberta Curini, Marcella Ioele, Paolo Postorino, Armida Sodo, "Gel substrates and ammonia-EDTA extraction solution: a new non-destructive combined approach for the identification of anthraquinone dyes from wool textiles", *Microchemical Journal* 155 (2020) 104780.

[P_15] Alessandro Ciccola, Luciana Tozzi, Martina Romani, Ilaria Serafini, Francesca Ripanti, Roberta Curini, Francesco Vitucci, Mariangela Cestelli Guidi, Paolo Postorino, "Lucio Fontana and the light: Spectroscopic analysis of the artist's collection at the National Gallery of Modern and Contemporary Art", *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy* 236 (2020) 118319.

[P_16] Rossella Gagliano Candela, Livia Lombardi, Alessandro Ciccola, Ilaria Serafini, Armandodoriano Bianco, Paolo Postorino, Lorella Pellegrino, Maurizio Bruno, "Deepening Inside the Pictorial Layers of Etruscan Sarcophagus of Hasti Afunei: An

Innovative Micro-Sampling Technique for Raman/SERS Analyses”, *Molecules* 2019, 24, 3403; doi:10.3390/molecules24183403.

[P_17] Claudio Frezza, Alessandro Venditti, Francesco Pizzoli, Ilaria Serafini, Alessandro Ciccola, Massimo Pitorri, Fabio Sciubba, Kevin Cianfaglione, Filippo Maggi, Mauro Serafini, Armandodoriano Bianco, “Essential oil composition and total metabolite content of a chemotype of *Ajuga reptans* L. (Lamiaceae) collected in Central Italy”, *Plant Biosystems - An International Journal Dealing with all Aspects of Plant Biology - Official Journal of the Società Botanica Italiana* (2019), <https://doi.org/10.1080/11263504.2018.1515121>.

[P_18] Elisa Calà, Marcello Benzi, Fabio Gosetti, Andrea Zanin, Monica Gulmini, Ambra Idone, Ilaria Serafini, Alessandro Ciccola, Roberta Curini, Isabella Whitworth, Maurizio Aceto, “Towards the identification of the lichen species in historical orchil dyes by HPLC-MS/MS”, *Microchemical Journal* (2019), 150, 104140.

[P_19] Claudio Frezza, Alessandro Venditti, Chiara Toniolo, Daniela De Vita, Ilaria Serafini, Alessandro Ciccola, Marco Franceschin, Antonio Ventrone, Lamberto Tomassini, Sebastiano Foddai, Marcella Guiso, Marcello Nicoletti, Armandodoriano Bianco, Mauro Serafini “*Pedicularis* L. Genus: Systematics, botany, phytochemistry, chemotaxonomy, ethnopharmacology, and other” *Plants (Basel)*, (2019), 8(9), 306.

[P_20] Elisa Calà, Fabio Gosetti, Monica Gulmini, Ilaria Serafini, Alessandro Ciccola, Roberta Curini, Annalisa Salis, Gianluca Damonte, Kathrin Kininger, Thomas Just, Maurizio Aceto, It’s Only a Part of the Story: Analytical Investigation of the Inks and Dyes Used in the Privilegium Maius, *Molecules* (2019), 24, 2197; doi:10.3390/molecules24122197.

[P_21] Alessandro Venditti, Claudio Frezza, Giacomo Rossi, Ilaria Serafini, Alessandro Ciccola, Fabio Sciubba, Sebastiano Foddai, Lamberto Tomassini, Armandodoriano Bianco, Mauro Serafini, A new bicyclic monoterpene glucoside and a new biflavone from the male reproduction organs of *Wollemia nobilis*, *Fitoterapia* (2019), 133: 62–69.

[P_22] Alessandro Ciccola, Ilaria Serafini, Marcella Guiso, Francesca Ripanti, Fabio Domenici, Fabio Sciubba, Paolo Postorino, Armandodoriano Bianco, Spectroscopy for contemporary art: Discovering the effect of synthetic organic pigments on UVB degradation of acrylic binder, *Polymer Degradation and Stability* (2019), 159: 224-228.

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This patent was also object of further funding, as it was included in the Sapienza's "Boosting Innovation Technology for Market Product Solutions - BIT4MaPS" project, funded by the Italian Ministry of Economic Development for the industrial scale-up [inside the Proof of Concept (PoC) programs for Universities- Enhancement of patents through the funding of Italian Public Research Institutions (EPRs) and Institutes for Hospitalization and Treatment of Scientific Character (IRCCS) (*in Italian: Bando MISE per la realizzazione di programmi di valorizzazione dei brevetti tramite progetti di Proof of Concept (PoC) delle Università italiane, degli Enti Pubblici di Ricerca (EPR) italiani e degli Istituti di ricovero e cura a carattere scientifico (IRCCS)*)].

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