Eva Mariasole Angelin

Conservation scientist

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I am a dynamic young researcher focused on the study of modern and contemporary heritage objects. This includes their color stability, characterization of the constitutive materials and degradation mechanisms mainly with spectroscopic analytical methods, such as UV-Vis-NIR, Raman, infrared and luminescence methods. The photostability and alteration of polymeric materials and modern colorants are among my research interests.

My latest achievement is the award of a contract as Conservation Scientist at the Conservation Science Department of the Deutsches Museum (Munich, Germany). In July 2021, I will discuss my PhD thesis in Conservation Science from NOVA School of Science and Technology. The project focused on the degradation of colorants in plastic artifacts. The work included the development of suitable and innovative multi-analytical approaches for the characterization of the colorants and the insight into the photodegradation mechanisms responsible for their alteration.

PROFESSIONAL EXPERIENCE

2021/06 - present	**Conservation scientist** / Chemist Conservation Science Department, Research Institute - Deutsches Museum (Germany)
2021/02 - 2021/06	**Researcher** Department of Conservation and Restoration and LAQV-REQUIMTE - NOVA University Lisbon (Portugal)
2015/12 - 2016/01	**Trainee** Hoepli International Bookshop (Italy)
2015/10 - 2015/11	**Cultural event planner / volunteer** Servizio Raccolte Artistiche - Castello Sforzesco (Italy)
2012/06 - 2014/07	**Research trainee / volunteer** Department of Physics - University of Milan (Italy)

EDUCATION

2016/03 - present	**PhD in Conservation Science** NOVA University Lisbon (Portugal) Thesis title: "*The fate of colors in the 20th - 21st centuries: preserving the organic colorants in plastic artifacts*" Supervisor: Prof. Maria João Melo, Dr. Marcello Picollo, Dr. Austin Nevin
2012/10 - 2015/03	**MSc in Science for Cultural Heritage Conservation** University of Parma (Italy) - 'Nello Carrara'' Institute of Applied Physics of the Italian National Research Council (Italy) Thesis title: "*Characterization of colorimetric properties and lightfastness of transparent polymeric materials used in restoration*" Supervisors: Prof. Danilo Bersani, Dr. Marcello Picollo

Grade: 110/110 cum laude

2008/09 - 2012/04 **BSc in Science and Technology for Cultural Heritage Conservation**
University of Parma (Italy)
Thesis title: "*Update knowledge and complexity of museum lighting*"
Supervisors: Prof. Danilo Bersani, Prof. Claudio Oleari
Grade: 110/110 cum laude

PARTICIPATION IN FUNDED RESEARCH PROJECTS

2021/02 - present *Plastic Paints in Art: the impact of manufacturing processes on their long-term stability*
Financed by Fundação para a Ciência e Tecnologia (IF/00653/2015/CP1293/CT0005)

2018/01 - present *NEMOSINE - Innovative packaging solutions for storage and conservation of 20th century cultural heritage of artefacts based on cellulose derivatives*
Financed under the EU Framework Programme for Research and Innovation Horizon 2020 (grant Agreement N° 760801)

2019/05 - 2019/12 *The Triumph of Bakelite - Contributions for a History of Plastics in Portugal*
Financed by Fundação para a Ciência e Tecnologia (PTDC/IVCHFC/5174/2014)

SUPERVISION

2021/02 - present **Consultant.** MSc in Conservation and Restoration
Student: Carolina Viana
Thesis title: "*Are all vinyl paints the same? The impact of paint formulations on their stability and the state of conservation of Ângelo de Sousa paintings*"
Department of Conservation and Restoration - NOVA University Lisbon (Portugal)

2018/09 - 2019/10 **Co-supervisor.** MSc in Conservation Science
Student: Sofia Nunes
Thesis title: "*Acetato de celulose em património cultural: o grau de substituição como indicador da degradação*"
Department of Conservation and Restoration - NOVA University Lisbon (Portugal)

2017/09 - 2018/10 **Co-supervisor.** MSc in Conservation and Restoration
Student: Inês Celorico
Thesis title: "*Filling the gaps: dyes for the epoxy resins used in the conservation of glass*"
Department of Conservation and Restoration - NOVA University Lisbon (Portugal)

2016/09 - 2017/10 **Co-supervisor.** MSc in Conservation Science
Student: Artur Neves
Thesis title: "*An early alert system for the conservation of cellulose nitrate heritage: fluorophores as degradation markers*"
Department of Conservation and Restoration - NOVA University Lisbon (Portugal)

MENTORING / TUTORING

2021/04 - 2021/06	Analytical Methods for Cultural Heritage (practical sessions, MSc) Department of Conservation and Restoration - NOVA University Lisbon (Portugal)
2017/03 - 2017/06	Analytical Methods for Cultural Heritage (practical sessions, MSc) Department of Conservation and Restoration - NOVA University Lisbon (Portugal)

LIST OF PUBLICATIONS

Book chapter

1. Pozzi F, Rizzo A, Basso E, Angelin EM, França de Sá S, Cucci C, Picollo M. Portable spectroscopy for cultural heritage: applications and practical challenges. In: Crocombe RA, Leary PE, Kammrath BW, editors. Portable Spectroscopy and Spectrometry 2: Applications. Hoboken: John Wiley and Sons Ltd, first ed., Vol 2; 2021. p. 499-522. ISBN 978-1-119-63640-3.

Conference proceedings

1. Angelin EM, Cucci C, Picollo M. UV-Vis-NIR reflectance spectroscopy: its application to the study of plastic heritage. In: Marchiafava V, Picollo M, editors. Colour and Colorimetry Multidisciplinary Contributions. Milano: Gruppo del Colore - Associazione Italiana Colore, Vol XVI B; 2020. p. 115-121.
2. Angelin EM, Gargano M, Santilli O, Ludwig N, Scotuzzi S. Nuovi metodi di illuminazione per la conservazione e la valorizzazione di opere pittoriche: studio preliminare. In: Rossi M, Siniscalco A, editors. Colore e Colorimetria Contributi Multidisciplinari. Santarcangelo di Romagna: Maggioli spa, Vol IX A: 2013. p. 193-202.

Journal article

1. Gargano M, Scotuzzi S, Angelin EM, Santilli O, del Hoyo-Meléndez JM, Ludwig N. A new lighting method for cultural materials using selective chromatic light. Light Res Technol. 2021. *Accepted.*
2. Micheluz A, Angelin EM, Almeida Lopes J, Melo MJ, Pamplona M. Discoloration of historical plastic objects: new insight into the degradation of *β*-naphthol pigment lakes. Polymers 2021; 13: 2278. DOI: 10.3390/polym13142278
3. Angelin EM, França de Sá S, Soares I, Callapez ME, Ferreira JL, Melo MJ, Bacci M, Picollo M. Application of infrared reflectance spectroscopy on plastics in cultural heritage collections: a comparative assessment of two portable mid-Fourier transform infrared reflection devices. Appl Spectrosc. 2021; 75: 818-833. DOI: 10.1177/0003702821998777.
4. Angelin EM, Conceição Oliveira M, Nevin A, Picollo M, Melo MJ. To be or not to be an azo pigment: chemistry for the preservation of historical *β*-naphthol reds in cultural heritage. Dyes Pigm. 2021; 190: 109244. DOI: 10.1016/j.dyepig.2021.109244.
5. Angelin EM, França de Sá S, Picollo M, Nevin A, Callapez ME, Melo MJ. The identification of synthetic organic red pigments in historical plastics: developing an in situ analytical protocol based on Raman microscopy. J Raman Spectrosc. 2021; 52: 145-158. DOI: 10.1002/jrs.5985.
6. Angelin EM, Ghirardello M, Babo S, Picollo M, Chelazzi L, Melo MJ, Nevin A, Valentini G, Comelli D. The multi-analytical in situ

analysis of cadmium-based pigments in plastics. Microchem J. 2020; 157: 105004. DOI: 10.1016/j.microc.2020.105004.

7. Nunes S, Ramacciotti F, Neves A, Angelin EM, Ramos AM, Roldão É, Wallaszkovits N, Armijo AA, Melo MJ. A diagnostic tool for assessing the conservation condition of cellulose nitrate and acetate in heritage collections: quantifying the degree of substitution by infrared spectroscopy. Herit Sci. 2020; 8: 1-14. DOI: 10.1186/s40494-020-00373-4.
8. Vieira M, Nabais P, Angelin EM, Araújo R, Lopes JA, Martín L, Sameño M, Melo MJ. Organic red colorants in Islamic manuscripts (12th-15th c.) produced in al-Andalus, part 1. Dyes Pigm. 2019; 166: 451-459. DOI: 10.1016/j.dyepig.2019.03.061.
9. Neves A, Angelin EM, Roldão É, Melo MJ. New insights into the degradation mechanism of cellulose nitrate in cinematographic films by Raman microscopy. J Raman Spectrosc. 2019; 50: 202-212. DOI: 10.1002/jrs.5464.
10. Angelin EM, Babo S, Ferreira JL, Melo MJ. Raman microscopy for the identification of pearlescent pigments in acrylic works of art. J Raman Spectrosc. 2019; 50: 232-241. DOI: 10.1002/jrs.5431.
11. Miliani C, Monico L, Melo MJ, Fantacci S, Angelin EM, Romani A, Janssens K. Photochemistry of artists' dyes and pigments: towards better understanding and prevention of colour change in works of art. Angew Chem Int Ed. 2018; 57: 7324-7334. DOI: 10.1002/anie.201802801.
12. Angelin EM, Bacci M, Bartolozzi G, Cantisani E, Picollo M. Contemporary artists' spinel pigments: Non-invasive characterization by means of electronic spectroscopy. Spectrochim. Acta A 2017; 173: 510-515. DOI: 10.1016/j.saa.2016.10.002.

CONFERENCE PRESENTATIONS

In situ identification of plastics: evaluation, comparison and application of external and diffuse reflectance FTIR accessories
IRUG14 Conference, 27-29 May 2020, Amersfoort (The Netherlands)

UV-Vis-NIR reflectance spectroscopy: its application to the study of plastic heritage
XVI Color Conference, 3-4 September 2020, Bergamo (Italy)

Plastics at an exhibition: a critical assessment of mid-infrared reflection techniques in cultural heritage
The Plastics Heritage Congress 2019, 29-31 May 2019, Lisbon (Portugal)

A closer look at red in Portuguese historical plastics: a Raman microscopy study
10th International Congress of the Application of Raman Spectroscopy in Art and Archeology (RAA2019), 3-7 September 2019, Potsdam (Germany)

Organic reds in Al-Andaluz: a study on medieval Islamic manuscripts
37th Meeting of Dyes in History and Archaeology (DHA 37), 25-26 October 2018, Lisbon (Portugal)

Photophysical properties of β-naphthol pigments in plastics
Gordon Research Conference, Scientific Methods in Cultural Heritage Research, 22-27 July 2018, Barcelona (Spain)

UV-Vis-NIR reflectance spectroscopy: a review of its application to the study of contemporary art materials

3rd International Conference on Innovation in Art Research and Technology (InArt2018), 26-29 March 2018, Parma (Italy)

Degradation of cellulose nitrate cinematographic films: a comparative analysis by Raman microscopy
9th International Congress of the Application of Raman Spectroscopy in Art and Archaeology (RAA2017), 24-28 October 2017, Évora (Portugal)

Pearlescent pigments in plastic artworks: a micro-Raman identification
9th International Congress of the Application of Raman Spectroscopy in Art and Archaeology (RAA2017), 24-28 October 2017, Évora (Portugal)

Studio della stabilità alla luce di alcuni prodotti impiegati nel restauro
100° Congresso Nazionale della Fisica (SIF), 22-26 September 2014, Pisa (Italy)

CONFERENCE POSTERS

New insights into the photochemistry of beta-naphthol pigments
International Symposium on Dyes & Pigments - Modern Colorants, 8-11 September 2019, Seville (Spain)

Cellulose acetate in works of art: exploring the causes of its degradation
The Plastics Heritage Congress 2019, 29-31 May 2019, Lisbon (Portugal)

NEMOSINE: Innovative packaging solutions for storage and conservation of 20th century cultural heritage of artefacts based on cellulose derivatives
The Plastics Heritage Congress 2019, 29-31 May 2019, Lisbon (Portugal)

The fate of colors in the 20th-21st centuries: preserving organic colorants
Young Hipom Professionals (Yhip 2019) Summer School/Research Seminar, 27-28 May 2019, Caparica (Portugal)

A new lighting method for cultural materials using selective chromatic light
Technart 2019, 7-10 May 2019, Bruges (Belgium)

Vibrational analysis of β-naphthol colorants: a comparative study through IR and Raman spectroscopy
13th Infrared and Raman User's Group (IRUG 13), 5-7 December 2018, Sydney (Australia)

Photophysical properties of beta-naphthol pigments
37th Dyes in History and Archaeology (DHA37), 25-26 October 2018, Caparica (Portugal)

Photophysical properties of β-naphthol pigments in plastics
Gordon Research Conference, Scientific Methods in Cultural Heritage Research, 22-27 July 2018 Barcelona (Spain)

Preserving the color of contemporary art: identification of colorants in plastic materials
3rd International Conference on Innovation in Art Research and Technology (InArt2018), 26-29 March 2018, Parma (Italy)

Computational chemistry in cultural heritage: theoretical predictions of vibrational spectra for alizarin lakes.
9th International Congress of the Application of Raman Spectroscopy in Art and Archeology (RAA2017), 24-28 October 2017, Évora (Portugal)

A taste of pearl: (re)discovering a modern lead white in PMMA sculptures.
ICOM-CC 18th Triennial, 4-8 September 2017, Copenhagen (Denmark)

EVENT ORGANISATION

2019 **Member of the Organizing Committee**

Young Hipom Professionals (Yhip 2019), “Perspectives in Historic Polymeric Materials” Summer School/Research Seminar, 27-28 May 2019, NOVA University Lisbon, Caparica (Portugal)

2019 **Member of the Organizing Committee**
The Plastics Heritage Congress 2019, 29-31 May 2019, Centro Interuniversitário de História das Ciências e da Tecnologia and NOVA University Lisbon, Lisbon (Portugal)

2018 **Member of the Organising Committee**
37th Meeting of Dyes in History and Archaeology (DHA 37), 25-26 October 2018, NOVA University Lisbon, Caparica (Portugal)

2018 **Co-organiser of the CORES Seminar and Workshop**
Practical Raman spectroscopy in conservation science: a molecular fingerprint tool, 8-10 May 2018, NOVA University Lisbon, Caparica (Portugal)

2018 **Co-organiser and curator of the exhibition**
An Artist's Garden by Nabil Ali, 13 September - 29 October 2018, Biblioteca FCT UNL, Caparica (Portugal)

2015 **Member of the Organising Committee**
Agenda Restauri 2014-2015, 18 November 2015, Castello Sforzesco, Milano (Italy)

WORKSHOPS, TRAINING and COURSES

2019/06 *One day Workshop about Raman spectroscopy: talking with the experts*
CENIMAT - NOVA University Lisbon (Portugal)

AWARDS

2018/03 **Best Young Scientist Oral Presentation**
3rd International Conference on Innovation in Art Research and Technology (InArt2018), 26-29 March 2018, Parma (Italy)
Presentation title: "*UV-Vis-NIR reflectance spectroscopy: a review of its application to the study of contemporary art materials*".

CERTIFICATES

2015 Academic IELTS, English

LANGUAGUES

	Speaking	Reading	Writing	Listening
Italian (Mother tongue)				
English	Advanced (C1)	Proficiency (C2)	Advanced (C1)	Advanced (C1)
Portuguese	Advanced (C1)	Advanced (C1)	Upper intermediate (B2)	Proficiency (C2)