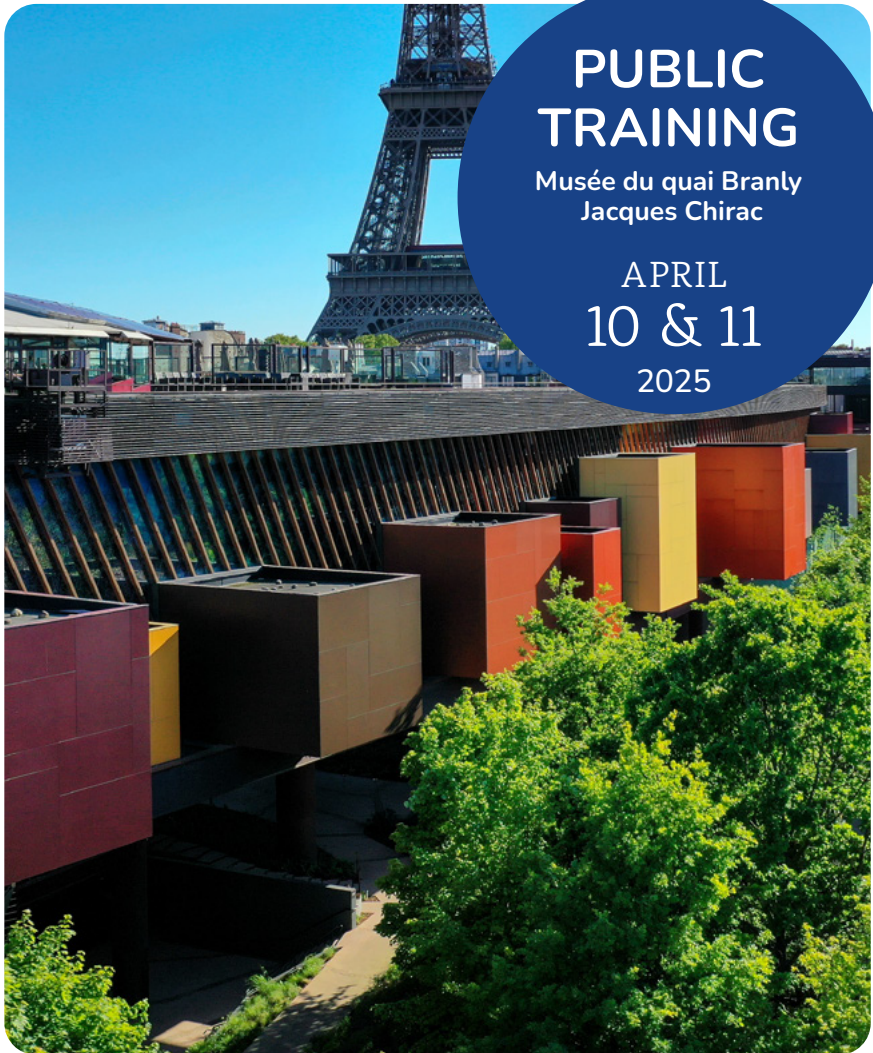


GREENART

GR^Een EN^deavour in Art Res^Toration



**PUBLIC
TRAINING**

Musée du quai Branly
Jacques Chirac

APRIL
10 & 11
2025



**MUSÉE DU QUAI BRANLY
JACQUES CHIRAC**

GREENART

GREEn ENdeavour in Art ResToration

GREENART proposes new solutions, based on green and sustainable materials and methods, and on the elaboration of advanced tools, to preserve, conserve and restore cultural heritage. The main objective is to produce safe and effective solutions for the remedial and preventive conservation of cultural heritage, based on environmentally friendly and low-impact materials made from renewable natural sources or recycled waste.

The training organized by the European project GREENART and by the musée du quai Branly – Jacques Chirac aims to explore the consortium activities, to spread knowledge generated during the development of the project within academic, professional, potential users and industrial domains in addition to upskill key stakeholders and staff on the use of the novel materials/tools/ solutions applied to the conservation of cultural heritage.

The training focuses on four essential sections:

- Lectures and presentations on the theoretical, research and implementation aspects of the novel materials and solutions
- Five practical workshops around the application methodologies and the use of some developed technologies
- A final open question and answer session
- A multimedia room for looping short video projections about green conservation and preventive conservation projects

PRACTICAL INFORMATION:

Théâtre Claude Lévi-Strauss (theoretical part of the first day)
Foyer du théâtre Claude Lévi-Strauss (practical part of the second day)
Salle de cinéma (for video projections)

ORGANISATION: Éléonore Kissel, musée du quai Branly — Jacques Chirac
Antonio Mirabile, GREENART project

PROJECT TITLE: GREEn ENdeavour in Art ResToration

ACRONYM: GREENART

STARTING DATE: 1 October 2022

DURATION: 30 September 2025

FUNDED UNDER: Culture, creativity and inclusive society

EU CONTRIBUTION: € 3 826 282,50

Photographic credits: © musée du quai Branly - Jacques Chirac, photo Timescope
Graphic Design: saraprince.net

10 APRIL 2025

FIRST DAY

09:30 – 09:45: Getting together

SESSION 1

Théâtre Claude Lévi-Strauss

CHAIR: ÉLÉONORE KISSEL,

Musée du quai Branly — Jacques Chirac

09:45 – 10:05 Martina Menegaldo:

Life Cycle Safety and Sustainability Assessment of innovative bio-based solutions for art restoration

10:05 – 10:25 Manfred Anders and Katharina Schuhmann:

Active, intelligent and sustainable impulses for archival packaging

10:25 – 10:45 Costas Galiotis:

Conservation of cultural heritage through graphene-enabled technologies

10:45 – 11:05 Salvador Muñoz-Viñas and María Sobrino-Estalrich:

A greener mounting system for paper artworks

11:05 – 11:20 Q&A

11:20 – 11:35 Coffee break

SESSION 2

Théâtre Claude Lévi-Strauss

CHAIR: STÉPHANIE ELARBI,

Musée national d'art moderne – Centre Pompidou

11:35 – 11:55 Marino Lavorgna and Letizia Verdolotti:

Innovative sustainable coatings and custom-made composite polyurethane foams for cultural heritage preservation

11:55 – 12:15 Gabriella Di Carlo:

Bio-based multifunctional coatings for a tailored and long-term protection of metal cultural objects

12:15 – 12:35 Camila A. Rezende and Camilla H. M. Camargos:

Nanocellulose-based coatings and hydrogels for cultural heritage conservation

12:35 – 12:55 Romain Bordes:

Development of green dispersion for the consolidation of encaustic paintings

12:55 – 13:10 Q&A

13:10 – 14:30 Lunch break

SESSION 3

Théâtre Claude Lévi-Strauss

CHAIR: AGNÈS GALL-ORTLIK,

ARCP Atelier de restauration et conservation des photographies, Ville de Paris

14:30 – 14:50 Piero Baglioni:

New "green" and sustainable materials for the wet cleaning of works of art

14:50 – 15:10 Bronwyn Ormsby:

Evaluating and assessing novel cleanings systems for the cleaning of works of art: GREENART at Tate

15:10 – 15:30 Athina Georgia Alexopoulou:

Proposal of user-friendly methodologies for the evaluation of green materials

15:30 – 15:50 Balázs Lencz and Norbert Németh:

Evaluation of green materials, developed in GREENART project, used in the treatment of historical objects at the HNM PCC

15:50 – 16:05 Q&A

16:05 – 16:20 Coffee break

SESSION 4

Théâtre Claude Lévi-Strauss

CHAIR: ÉMILIE DOMINEY,

Independent conservator

16:20 – 16:40 Penelope Banou:

Varnish removal on works of art on paper. Evaluating the results of gel applications

16:40 – 17:00 Martina Vuga & Lucija Močnik Ramovš:

Some observations on the new cleaning systems used for varnish removal

17:00 – 17:20 Soraya Alcalá :

Assessing sustainable hydrogels to mitigate discoloration in cotton canvas artworks

17:20 – 17:40 Laura Maccarelli and Jessica Chasen:

The LACMA Case study: application of several green gels to polychrome surfaces

17:40 – 18:00 Q&A

11 APRIL 2025

SECOND DAY

09:30 OPENING OF THE MULTIMEDIA ROOM WHICH WILL FOLLOW THE WORKSHOP CYCLE :

Salle de cinéma

looping short video projections about green conservation and preventive conservation projects.

09:30 – 11:00

WORKSHOPS: FIRST CYCLE OF PRACTICAL ACTIVITIES

Foyer du théâtre Claude Lévi-Strauss

WS1: GIOVANNA POGGI:

Innovative green gels for the cleaning of works of art

- Introduction to gels
- Innovative gels developed within GREENART
- Demonstration of gels features and handling
- How to apply gels in conservation practice (also loaded with innovative green fluids)

WS2: CAMILA A. REZENDE AND CAMILLA H. M. CAMARGOS:

Nanocellulose/nanolignin protective coatings and nanocellulose/biopolymer hydrogess

- Overview of the properties and handling of nanocellulose- and nanolignin-based materials for cultural heritage conservation
- How to apply water-based nanocellulose coatings on aged and unaged cellulosic substrates
- How to apply nanocellulose/biopolymer hydrogels to remove artificial soil or aged adhesives from smooth or rough mock-up surfaces

WS3: FRANCESCA BOCCACCINI:

Sustainable protective coatings for metal cultural objects: properties and application

- Introduction to the novel sustainable coatings: benefits and challenges of biopolymer-based materials

- How to apply the protective materials on mock-ups with different composition and surface finish
- Demonstration of the aesthetic properties and reversibility
- Application on metal objects

WS4: MANFRED ANDERS AND KATHARINA SCHUHMANN:

Integration of sustainable raw materials, novel regulators and sensing devices in archive box production

- Examples of customized storage solutions for special applications in archives / museums will be presented
- Improved box constructions will be presented
- Sustainable raw materials will be demonstrated
- The utilization of an integrated T/RH sensor transponder can be tested
- Modular combinability of green acid/VOC absorbents or antifungal materials with the storage enclosures will be demonstrated and can be tested

WS5: ANDREA CASINI:

Art Conservation goes green: Sustainable and "green" cleaning fluids with low impact solvents and surfactants

- The shift toward sustainable conservation
- Guidelines for a "greener" selection
- Innovations in green cleaning solutions
- Practical use and impact on conservation workflows

11:00 – 11:15 Coffee break

11:15 – 12:45 Second cycle of practical activities

Foyer du théâtre Claude Lévi-Strauss

12:45 – 14:00 Lunch break

14:00 – 15:30 Third cycle of practical activities

Foyer du théâtre Claude Lévi-Strauss

15:30 – 15:45 Coffee break

15:45 – 17:15 A final open question and answer session

Théâtre Claude Lévi-Strauss

ABSTRACTS AND SHORT CV

SESSION 1

Chair: Eléonore Kissel

Musée du quai Branly – Jacques Chirac, Paris, France

email: eleonore.kissel@quaibrantly.fr

Éléonore Kissel received a Master degree in Paper Conservation from Paris I - Panthéon Sorbonne University in 1994, followed by a Professional Master Degree in Preventive conservation in 1997. Within the consultancy agency In Extenso, she carried out numerous collection surveys in collaboration with multidisciplinary teams. These missions took place in museums, historical monuments, archives and libraries mainly in France and occasionally in North America, Asia and Africa.

In 2014 she joined the musée du quai Branly as Head of Preservation, where she coordinates preservation and conservation projects on approximately 370,000 non-European archaeological and historical objects, nearly 800,000 photographs and 11 linear kilometers of library and archives holdings. In 2022-2023 she spent six months as a Visiting Scholar at the University of California, Los Angeles, on the decolonization of conservation practices for cultural property. She currently pursues a PhD in conservation at CY University.

Martina Menegaldo⁺

PhD student in Environmental Sciences at Ca' Foscari University of Venice, Italy

⁺ Presenting and corresponding author

email: martina.menegaldo@unive.it

Life Cycle Safety and Sustainability Assessment of innovative bio-based solutions for art restoration

The main challenge in assessing innovative solutions during the design phase lies in the integration of quantitative assessment approaches, as most products are at a low Technology Readiness Level (TRL) and are still at the laboratory or pilot scale, therefore appropriate data might be lacking. To address this, and in view of achieving the goals of the EU Green Deal, GREENART proposes a stepwise three-stage approach to assess the safety and sustainability performance of its innovative solutions throughout their entire life cycle, providing product developers and final users with a tool for informed decision-making. Stage 1 consists of the hazard assessment of GREENART ingredients and formulations. Stage 2 includes a screening sustainability assessment and, finally, in stage 3, Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) are employed to estimate environmental and economic impacts along the life cycle of the most promising innovative solutions, comparing them to existing solutions. During the presentation, the GREENART assessment approach will be introduced, with a particular focus on methodologies for assessing environmental and economic sustainability, specifically LCA and LCC.

Martina Menegaldo is a PhD student in Environmental Sciences at Ca' Foscari University of Venice (Italy) with a fellowship funded by the Greenart HEU project. Her research focuses on the Safe and Sustainable by Design Assessment of novel bio-based chemicals and materials, with a particular focus on integrating Risk Assessment (RA) and Life Cycle Assessment (LCA) methodologies. She is actively involved in several HEU and CBE JU projects, including BioSusTex and SurfToGreen, which aim to develop innovative bio-based chemicals and processes for the textile sector and beyond.

Manfred Anders⁺ and Katharina Schuhmann⁺

ZFB Zentrum für Bucherhaltung GmbH, Leipzig, Germany

⁺ Presenting and corresponding authors

email: anders@zfb.com and schuhmann@zfb.com

Active, intelligent and sustainable impulses for archival packaging

As one of the processing enterprises among the GREENART partners, ZFB deals with customer-oriented solutions for the conservation of cultural heritage as well as the conception, development, manufacturing and distribution of archive boxes, made of corrugated board.

Preventive archive packaging is a main component for the original preservation of CH objects and provides basic protection against light, dust, short-term climate fluctuations and mechanical stress. By adding active and intelligent components to conventional corrugated board enclosures, material-specific desirable interior climate conditions can be created and observed within the packaging.

Contributing to the projects' objectives of creating green packaging solutions, ZFB's research department strongly focuses on the investigation of annual plants and their potential as raw materials for sustainable archive packaging solutions. In a second approach, packaging materials from recycled or bio-based polymers (hollow chamber sheets) are considered as an alternative to the current state of the art virgin wood fibre raw materials.

Further, improved box constructions and measures for the possible integration of novel green components for active acid and VOC absorption, antifungal protection and greener intelligent measuring devices within the enclosures will be demonstrated.

Manfred Anders is specialist for paper, cellulose and textile chemistry. He received his PhD "Analysis of paper ageing and preservation of damaged papers by deacidification and consolidation" at the University of Stuttgart in 2000, held teaching assignments in Reutlingen and Hildesheim and has been a member of the IADA board from 1999-2007. Since 2002 he works as CEO and head of R&D of ZFB ZENTRUM FÜR BUCHERHALTUNG GmbH.

Katharina Schuhmann is an engineer for printing and packaging technologies and joined ZFB ZENTRUM FÜR BUCHERHALTUNG GmbH in 2015, where she works as researcher for active and preventive conservational product and process innovation.

Costas Galiotis⁺

Foundation of Research and Technology – Institute of Chemical Engineering Sciences, Patras, Greece

Department of Chemical Engineering, University of Patras, Patras, Greece

⁺ Presenting and corresponding author

email: c.galiotis@iceht.forth.gr

Conservation of cultural heritage through graphene-enabled technologies

Graphene is the first isolated monoatomic material, made solely of carbon atoms arranged in a two-dimensional honeycomb lattice. It is flexible, transparent, impermeable to harmful compounds, such as oxygen moisture and corrosive gases, and can adhere quite easily to various substrates. Over the last few years, our group has pioneered the design and the development of graphene-based solutions for the remedial and preventive conservation of tangible cultural heritage. In fact, we have deposited continuous graphene veils over real paintings without altering their visual appearance, demonstrating protection factor against colour fading up to 70%. Exploiting graphene and related materials in powder form (i.e. GNP, GO), we have also produced paints for use in both art and architecture, with intrinsic anti-fading properties and even other multifunctionalities. Moreover, we have developed intelligent solutions for the control and adjustment of environmental conditions on storing/displaying artworks. These solutions are based on the use of graphene sensors for the early detection of humidity and temperature fluctuations and of aggressive species (specially volatile organic compounds, VOCs) and of graphene aerogels with superior VOCs absorption and antifungal activity to preserve artworks against known threats, such as fungi and other pollutants.

Costas Galiotis is currently a Professor in the Department of Chemical Engineering at the University of Patras (since 2014) and a Collaborating Faculty Member of the Institute of Chemical Engineering Sciences (ICE-HT) which is one of the eight (8) academic research institutions of the Foundation of Research and Technology-Hellas (FORTH). His research areas are related to Graphene Related Materials (GRMs)/2D materials (Production and properties), Graphene-driven innovations in cultural heritage preservation, Composites & Polymers (Structural, mechanical and spectroscopic characterization of polymers and composites) and Non-Destructive Testing of Materials (World leader in the application of Laser Raman spectroscopy for stress or strain

measurements in fibres and composites. Application to both polymeric and ceramic based composites). Up to now, he has been responsible for the management of research projects and main co-ordinator/ partner of over 50 research programmes (funded by CEC, national bodies and industry) of total value of over 100 M€. To date he has handled over 18 M€ for work related to the activities of his own research group (ca. 20 people with very different backgrounds and coming from different countries and with good gender balance). He has vast experience in the areas of composite/advanced materials, graphene-based materials and nanotechnology, and is the main collaborator of the 2010 Nobel Prize in Physics Laureates, Profs. Novoselov and Geim, with regards to the investigation of mechanical properties of graphene. The importance of his scientific activity has been honoured in 2019 with the Aristieion of Academy of Athens in the Natural Sciences, which is the top academic annual award in Greece. Prof. Galiotis is also one of the founding members of the Graphene Flagship and is serving at its Executive Board since 2016. He is currently one of the top-leading experts in mechanics of graphene and its composites, and pioneer in the development of graphene-based solutions for preserving cultural heritage, as shown by the regular invitations as invited/keynote speaker, his role as organizer of major conferences and prestigious awards. He is the Editor in Chief of the Journal "Graphene and 2D Materials" (Springer-Nature) and EB Member of Scientific Reports (Nature) and of International Materials Reviews (Taylor & Francis). He is a Fellow of the European Academy of (EURASC) Sciences, a Member of Academia Europaea and a Fellow of the Institute of Materials, Minerals and Mining (IOM3). He has published approx. 450 journal papers, book chapters, reviews, proceedings etc which have been cited ~25000 times (Google Sch).

Salvador Muñoz-Viñas⁺¹ and María Sobrino-Estalrich²

¹ Instituto de Restauración del Patrimonio. Universitat Politècnica de València, Spain

² PhD student in Conservation and Restoration at Universitat Politècnica de València, Spain

⁺ Presenting and corresponding authors

email: smunoz@upv.edu.es and maria.s.estalrich@gmail.com

A greener mounting system for paper artworks

During the exhibition and storage of paper artworks, variations in humidity and temperature are an important issue, especially in the case of large and oversize artifacts. If there's any major fluctuation in the relative humidity, curling, undulations and other disfiguring distortions are likely to take place. For this reason, museums, galleries and other institutions invest a large amount of money and resources on air-conditioning systems for keeping humidity and temperature into narrow ranges.

To counter these common issues, we are presenting a mounting system based on the opposite behavior of fabric and paper when exposed to different relative humidities. The system can maintain the sheets flat within a much larger RH range than traditional systems. This mounting system can be used both for storage and exhibition, and allows for a reduction in the energy consumption and working costs of air conditioning systems.

Salvador Muñoz-Viñas is a Professor in the Universitat Politècnica de València, Spain, and Head of the Paper Conservation group of the university's Instituto de Restauración del Patrimonio (IRP-UPV). Along his career he has worked as a paper conservator in the Historical Library of the University of Valencia, as a Visiting Scholar in Harvard University's Straus Center for Conservation, or as a Distinguished Visiting Professor in the Conservation Center of the NYU. His research work revolves around both the theory of conservation and the technical aspects of paper conservation, and has been published in English, Spanish, Chinese, Korean, and other major languages.

María Sobrino-Estalrich completed her university degree and master's degree at the Universitat Politècnica de Valencia (UPV) and is currently pursuing a PhD within the Doctoral Program in Conservation and Restoration at the same university. Her thesis research is part of the European project GreenArt, because of this she also collaborates as a researcher at the UPV. Her field of study focuses on the restoration of graphic art and research of new materials. She has also participated in projects for the Paper Conservation group of the Instituto de Restauración del Patrimonio (IRP-UPV) as a conservator for different pieces.

ABSTRACTS AND SHORT CV

SESSION 2

Chair: Stéphanie Elarbi

Musée national d'art moderne – Centre Pompidou, Paris, France

email: stephanie.elarbi@centrepompidou.fr

Stéphanie Elarbi is head of the conservation department of the musée national d'art moderne - Centre Pompidou since 2023, she supervises the preservation of the modern and contemporary collections including painting, sculpture, installation, paper, photography, architecture and design departments. Currently involve in the development of the upcoming Centre Pompidou Francilien in Massy (Essonne), she collaborates to the achievement of the conservation labs and collections storage.

Trained as a conservator in contemporary art in Paris I - Panthéon Sorbonne University, she also developed expertise in the conservation of ethnographic collections, proposing to link both fields in the conservation protocols and practices. She joined the Musée du quai Branly – Jacques Chirac in 2002, to contribute to the conservation plan for the collection in the new born museum and become head of the conservation service from 2008 to 2023.

Marino Lavorgna⁺ and Letizia Verdolotti⁺

CNR, Istituto per i Polimeri Compositi e Biomateriali, Portici and Lecco,
Italy

⁺ Presenting and corresponding authors

email: marino.lavorgna@cnr.it and letizia.verdolotti@cnr.it

Innovative sustainable coatings and custom-made composite polyurethane foams for cultural heritage preservation

Cultural Heritage preservation faces considerable challenges due to the degradation of materials due to environmental factors, biological growth, and human interaction. In response, innovative and sustainable coatings and custom-engineered composite polyurethane foams offer promising solutions to address these issues. The research conducted by IPCB-CNR within the GREENART project focuses on developing and applying advanced polyurethane-based sustainable foams designed to protect and preserve artworks during storage and transportation. Additionally, the project investigates multifunctional coatings composed of eco-friendly and bio-based components, including hydrophobic-modified polysaccharides and acrylic resins synthesized from biorefinery-derived monomers to protect metal artworks. This research exploits the concept of nanostructured composites, incorporating zeolite as a volatile organic compound (VOC) adsorber and humidity regulator within the foams, as well as engineered mesoporous silica nanoparticles (MSNs), which act as highly effective nanoreservoirs and nanocarriers for the loading and controlled release of anticorrosive agents intended for the protection of metal substrates. The project seeks to customize packaging and develop sustainable coatings by engineering composite foams and integrating them with additive manufacturing potential. This approach enables the creation of innovative protective systems that safeguard artworks throughout various stages of cultural engagement.

Marino Lavorgna, PhD, is the Research Director at the Institute of Polymers, Composite, and Biomaterials of the National Research Council (IPCB-CNR). He was a visiting associate professor at Loughborough University (2003-2004) and has conducted research visits to Sichuan University from 2009 to 2019. Currently responsible for the SS IPCB-Lecco unit, his research focuses on designing and characterizing sustainable and multifunctional composites

for applications in packaging and cultural heritage protection. Dr. Lavorgna has published more than 200 ISI papers and seven book chapters and holds several patents, achieving an H-index of 50 on Google Scholar. He was also involved in several national and international projects, including CHANGES PNRR project and European initiatives like GreenArt, Apache, InnovaConcrete, and Nanorestart.

Letizia Verdolotti, PhD, is Senior Research Scientist at the Institute for Polymers, Composites and Biomaterials of the National Research Council (IPCB-CNR). Dr. Verdolotti is an expert in sustainability, decarbonization, and green materials, with a focus on the design and development of sustainable, multifunctional polymer composites and hybrids. Her research explores, mainly, the synthesis of foam composite materials with tunable properties derived from renewable and/or natural resources, bio-based functional fillers, and innovative processing technologies with low environmental impact. She has authored and co-authored 95 ISI publications, patents and book chapters (H-index of 30 in Scopus). Dr. Verdolotti has made significant contributions to advancing bio-based polymer composites, particularly in the areas of bio-based polyurethane composite foams for applications across diverse sectors, including: building, cultural heritage conservation, aerospace, and transport. She has successfully led national and international research projects focused on the study and development of new bio-based foam materials, addressing key challenges in sustainability and decarbonization. She is partner in two spin-off: Hypucem (<https://www.hypucem.com/>) and Officine-Aura (<http://www.spinoff.unina.it/spinoff/aura/>).

Gabriella Di Carlo⁺

CNR, Istituto per lo Studio dei Materiali Nanostrutturati, Rome, Italy

⁺ Presenting and corresponding author

email: gabriella.dicarlo@cnr.it

Bio-based multifunctional coatings for a tailored and long-term protection of metal cultural objects

Within the EU GREENART project, new sustainable protective coatings have been designed and developed using biopolymers, fillers and additives mainly produced from natural waste and renewable sources. Efforts have also been made to develop waterborne biopolymer-based formulations that can be easily handled, applied and removed from metal surfaces. The aesthetic and protective properties of the new coatings have been deeply investigated by UV-VIS spectroscopy, colorimetry and accelerated corrosion tests, whereas the long-term stability has been investigated by natural ageing in indoor environments. Commercial products, selected as benchmarks, were used for comparison. The validation activities are carried out in close collaboration with the conservators involved in the project.

Gabriella Di Carlo, PhD in Chemistry, is Senior Researcher at CNR-ISMN in Rome. Her main research interest includes the development of innovative materials and technologies for the sustainable conservation and fruition of Cultural Heritage. She works on the design, preparation and validation of active and multifunctional materials, mainly produced from natural waste and renewable sources. Moreover, surface studies at micro and nanoscale are carried out with correlative and multianalytical approaches. Her activities are mainly conducted within national and international projects (as the ongoing EU Greenart, MUR EcoForConcrete). She is co-author of more than 90 publications in international ISI journals receiving about 4000 citations and has an H-index of 31 (Source: Scopus).

Camilla H. M. Camargos⁺¹,
Isabella A. Silva²,
Felipe F. Meneses²,
Laura C. E. Silva²,
and Camila A. Rezende⁺²

¹ Federal University of Minas Gerais (UFMG),
Belo Horizonte – MG, Brazil

² University of Campinas (UNICAMP), Campinas – SP, Brazil

⁺ Presenting and corresponding authors

email: camillahmc@ufmg.br and camilaiq@unicamp.br

Nanocellulose-based coatings and hydrogels for cultural heritage conservation

We have been utilizing plant-derived nanostructures—specifically cellulose nanocrystals, cellulose nanofibrils, and lignin nanoparticles—extracted from sugarcane bagasse, an agro-industrial residue, to fabricate: (1) protective coatings and (2) hydrogels for cleaning cultural heritage objects. Both cellulose and lignin are abundant, cost-effective, renewable, biodegradable, and environmentally friendly materials with a remarkable amenability for chemical functionalization. Nanocellulose exhibits excellent mechanical properties and optical transparency, while lignin is rich in phenolic groups, offering antioxidant, antimicrobial, and UV shielding properties—attributes that are further enhanced at the nanoscale. Our primary goal is to develop and validate conservation strategies based on colloidal dispersions that dry as coating layers and flexible hydrogels by combining nanocellulose, lignin nanoparticles, and/or other biopolymers. These "greener" protective coatings and cleaning gels may serve as sustainable alternatives to the synthetic products currently used in the conservation and restoration of works of art, archaeological artifacts, and historical documents.

Camila Alves de Rezende is an Associate Professor at the Institute of Chemistry at UNICAMP. She holds a Bachelor's degree (2002), a Teaching degree (2003), a Master's degree in Chemistry (2004), and a PhD in Science (2007) from UNICAMP. Prof. Rezende completed her doctoral internship (2006) and postdoctoral research (2007-2008) at the Léon Brillouin Laboratory in

France, followed by additional postdoctoral work at the Institute of Chemistry at UNICAMP and the Institute of Physics at São Carlos (USP). She also had the opportunity to work as a visiting researcher at the Centre for Novel Agricultural Products (CNAP) at the University of York (2017). Throughout her career, she has contributed to various projects and gained expertise in colloidal and surface chemistry, polymers and nanoparticles, polymer blends and nanocomposites, biofuels, and the extraction of compounds from plant biomass. At UNICAMP, she coordinates the Laboratory of Biomass Chemistry and Morphology (LaQuiMoBio), focusing on the extraction of cellulose and lignin from plant biomasses for the production of fibers and nanoparticles. Her research explores their applications in polymer composites and nanocomposites, coating films, aerogels or solid foams, hydrogels, and cosmetics.

Camilla Henriques Maia de Camargos is an Assistant Professor in the Conservation and Restoration of Cultural Heritage program at the School of Fine Arts, UFMG. She holds a PhD in Science (Physical Chemistry) from the Institute of Chemistry at UNICAMP (2021) and completed a doctoral internship at the Department of Chemistry at the University of Florence (2020). She earned a Master's degree in Chemistry (Physical Chemistry) from the Department of Chemistry at UFMG (2016) and a Bachelor's degree in Conservation and Restoration of Cultural Heritage from the same institution (2013). Camilla has conducted short-term postdoctoral research at the University of Florence (2022), the Federal University of Pelotas (UFPeL, 2022-2023), and UNICAMP (2023-2024). Her work focuses on investigations and treatments related to the conservation and restoration of books, documents, and works of art on paper, with an emphasis on interdisciplinary studies applying chemistry to the characterization and deterioration processes of cellulosic substrates. Additionally, she develops advanced materials and sustainable nanotechnologies for the conservation of cultural heritage.

Yiming Jia, Michael Persson, Krister Holmberg, Romain Bordes⁺

Chalmers University of Technology, Gothenburg, Sweden

⁺ Presenting and corresponding author

email: bordses@chalmers.se

Development of green dispersion for the consolidation of encaustic paintings

Encaustic paintings are susceptible to degradation over time. Exposure to environmental fluctuations, such as changes in temperature and humidity, can lead to delamination and flaking, necessitating conservation actions. However, conventional adhesives, often incompatible with the original substrate, can introduce further deterioration. Encaustic paintings are usually consolidated with hot-melt consolidants, which offer limited bonding strength.

This presentation reports the development of a family of novel consolidants designed specifically for encaustic paintings, using a microstructured dispersion system of beeswax (BW), cellulose nanocrystals (CNC), and ethyl hydroxyethyl cellulose (EHEC). Here, the nanosized CNC particles act as natural stabilizers, removing the need for synthetic surfactants, while having a chemistry close to the one of the substrate. The emulsion displayed micron-sized spherical structure with droplet inclusion and a hollow micromorphology after drying. The CNC-stabilized beeswax microspheres, when combined with EHEC, yield a consolidant that achieves strong adhesion while maintaining the unique characteristics of encaustic artworks. Such an approach also ensures an eco-friendly solution. The incorporation of EHEC in the CNC/BW dispersion enhances viscosity and water resistance—key properties for strong adhesion and moisture protection, both critical to the conservation of encaustic paintings. Preliminary tests on mock-up samples have shown that the CNC/BW-EHEC dispersions offer strong adhesive properties and effective water resistance, underscoring its potential as a conservation adhesive.

Romain Bordes leads a research group in the Applied Chemistry division at Chalmers University of Technology in Gothenburg, Sweden. With a background in surfactant chemistry, his research focuses on the fundamental and applied aspects of soft matter and dispersed systems. In 2015, he began exploring novel surfactants and nanomaterials for art conservation, emphasizing nanocellulose and silica-based materials. His current work extends these efforts into preventive conservation applications.

ABSTRACTS AND SHORT CV

SESSION 3

Chair: Agnès Gall-Ortlik

Atelier de restauration et conservation des photographies, Ville de Paris, Paris, France

email: agnes.gall-ortlik@paris.fr

Agnès Gall-Ortlik graduated from the conservators' department of the Institut national du patrimoine (Inp) in 2000 and received a master degree in preventive conservation from Paris 1 - Panthéon Sorbonne University in 2015. In 2008 she was also a fellow at the French Academy in Rome – Villa Medici. She worked as free-lance conservator and company director of COREBARNA for institutions based in Europe and was during ten years the coordinator of the ICOM-CC ENAMEL network. In 2018 she joined the City of Paris as head of the ARCP, department in charge of the preservation of more than 16 million photographs conserved in different Parisian institutions (museums, libraries, archives). She has been reflecting and communicating regularly on the issue of green conservation, trying to raise awareness among professionals involved in heritage conservation. She is committed to a sustainable transformation of the ARCP and also provides an introduction training on green conservation for Inp student conservators.

Piero Baglioni⁺

University of Florence, Florence, Italy

⁺ Presenting and corresponding author

email: baglioni@csgi.unifi.it

New “green” and sustainable materials for the wet cleaning of works of art

Traditional cleaning methodologies, based on classical solution and polymer chemistry, only grant limited control of the cleaning interventions, and often involve toxic or non-environmentally friendly compounds. Alternatively, colloids and soft matter provide valuable and safe solutions like gels and nanostructured fluids. The new methodologies work on different physico-chemical mechanisms, such as detaching/dewetting, to selectively remove unwanted layers in sustainable and cost-effective interventions. In the framework of the GREENART project, novel "green" and sustainable gels and cleaning fluids were developed, selecting the best systems as a new sustainable platform of tools for conservators. Systems like “twin-chain” polyvinyl alcohol gels, decorated with bio-derived molecules, were assessed in the cleaning of masterpieces. The gels can be loaded with water or different water-based cleaning fluids. Particular attention was dedicated to “green” chemistry systems, using low-toxicity solvents or bio-based/waste materials to build gel networks.

Piero Baglioni is Emeritus Professor of Physical Chemistry in the Department of Chemistry at the University of Florence. He is on the editorial/advisory boards of several international journals and a member of the scientific board of several national and international institutions and societies. He is the author of more than 550 publications and 27 patents in the field of colloids and interfaces, and a pioneer in the application of soft matter to the conservation of Cultural Heritage.

Bronwyn Ormsby⁺

Tate, London, UK

⁺ Presenting and corresponding author

email: Bronwyn.Ormsby@tate.org.uk

Evaluating and assessing novel cleanings systems for the cleaning of works of art: GREENART at Tate

Dr. Bronwyn Ormsby will present practice lead research and current outcomes on Tate's contribution to the GREENART project. The Tate project has focused on the conservation treatment of painting(s) by British artist Bridget Riley (b. 1931) dating from the early-to mid-1960s. *Fall* (1963) and *Hesitate* (1964) are well-known examples of Riley's black and white paintings, comprised of poly vinyl acetate paints on hardboard. These paints have received relatively little attention with respect to understanding conservation treatment risk and optimising the removal of unwanted grime, scuffs, and soiling from these water-, solvent- and pressure-sensitive paint surfaces. The approach and methodology used to devise an optimal cleaning system will be presented and discussed, including the evaluation of several novel GREENART hydrogels alongside more familiar systems. The supporting scientific research into the effects of cleaning systems on contemporary poly vinyl acetate paints will be summarised, followed by a detailed description of the conservation treatment of *Fall*, carried out by the Tate GREENART team across 2024-25.

Dr. Bronwyn Ormsby is Tate's Principal Conservation Scientist and has led the Conservation Science and Preventive Conservation team since 2016. Bronwyn has specialisms in the analysis of synthetic polymers and modern paints as well as collaborative conservation treatment research. She disseminates widely and examples of her projects include The Rothko Conservation Project (2012-14), NANORESTART (2015-2018), CMOP (Cleaning Modern Oil Paints, 2015-2018) and currently GREENART (2022-2025); all of which aim to enhance and evaluate new (and green) options for the surface cleaning treatment of modern and contemporary art. Bronwyn was a key member of the GCI CAPS (Cleaning Acrylic Painted Surfaces) workshop team and lectures and delivers research into practice workshops for conservators and students nationally and internationally. Bronwyn is the 2024 recipient of the Plowden Medal awarded by peers for recent contributions to the advancement of the conservation profession.

Athina Georgia Alexopoulou⁺

University of West Attica, Athens, Greece

+ Presenting and corresponding author

email: athfrt@uniwa.gr

Proposal of user-friendly methodologies for the evaluation of green materials.

This contribution aims to propose user-friendly methodologies to assess the green cleaning systems and the new solutions for consolidation, as applied to the conservation of works of art, on representative mock-ups and real artefacts in order to select the best performing systems. Focus will be given to results from the comparative assessment with state-of-the-art tools on paintings and paper artworks. Furthermore, the testing procedure to evaluate new packaging materials mock-ups, regarding physical and mechanical properties, before and after appropriate artificial ageing, will also be discussed.

The methodology is based on non-destructive methods (testing (e.g. UV/Vis/IR hyperspectral imaging, colorimetry, glossimetry) that are green tech solutions since they are environmentally friendly, do not require sampling, have quick in situ application, do not involve consumables or waste materials, have very low energy consumption as well as the ability of post-processing imaging data. Special emphasis will be given to tools that professional conservators and museum curators could be used in their every day practice.

Athina Georgia Alexopoulou, Diploma and PhD in Chemical Engineering, National Technical University of Athens, is Professor at the Department of Conservation of Antiquities and Works of Art at the University of West Attica (UNIWA). She is member of the University Board and manager of the University's partnership to European HORIZON Project "GREEN ENdeavor in Art ResToration" (GREENART). She founded and leads the Research Laboratory "ARTICON: Conservation-Promotion of Visual Art, Book and Archival Material" and has organized, under its auspices, a wide range activities related to the protection and promotion of cultural heritage. She recently completed her appointment in the UNIWA's Council of Training and Lifelong Learning as well as in the Scientific Advisor Committee in Culture, Tourism and Creative Industries of the National Council for Research, Technology and Innovation. Her scientific activity covers the field of diagnostic non destructive methods and chemical microanalysis of artworks and archaeological objects for which she has received funding from multiple competitive national and European research grants. Her published work comprises monographs, scientific books, chapters in collective volumes, educational manuals, and many publications.

Balázs Lencz⁺ and Norbert Németh

Hungarian National Museum, Budapest, Hungary

⁺Presenting and corresponding author

email: lencz.balazs@hnm.hu

Evaluation of green materials, developed in GREENART project, used in the treatment of historical objects at the Hungarian National Museum PCC

The introduction of novel, sustainable materials and techniques in the field of preservation of Cultural Heritage is recognized and considered as crucial for the safe, long-term preservation of the 3.8 million objects, stored in the collections of the HNM PCC. The development of storage techniques and remedial treatments are effectively contributing to the establishment of a new approach in art conservation. The presentation will assess and discuss the practical experiences acquired by testing different green formulations, highlighting their effectiveness, limitations and possible capabilities of replacing traditional materials and methods. Observations will be shared in order to help decision making in future conservation treatments.

Balázs Lencz is the head of conservation at the HNM PCC and responsible for the coordination and development of preventive and remedial conservation treatments, storage conditions not only in the main collections of the museum, but also in the 14 affiliates of the institutional network. His research focuses mainly on metal based and oriental lacquered objects. He earned his doctoral degree at the Hungarian University of Fine Arts and involved in former and still active EU Horizon projects like APACHE and AURORA.

ABSTRACTS AND SHORT CV

SESSION 4

Chair: Émilie Dominey

Independent conservator, Paris, France

email: emilie.dominey@gmail.com

Emilie Dominey works as an independent conservator. She graduated from the Institut National du Patrimoine in objects' conservation and has been specializing herself in stone and plaster sculptures and in contemporary collections during her training and in her professional projects. She works for different institutions, museums and historical monuments mainly in France and Belgium. She participates in preliminary studies, conservation projects and collections' maintenance and survey.

She also is a member of the Fédération Française des Conservateurs-restaurateurs in which she is part of a group working on health and sustainability issues in conservation. Among other projects, this group has been creating recently a survey on sustainable practices in museums and heritage conservation in collaboration with the Association des préventeurs universitaires and the Association française des régisseurs d'oeuvres d'art.

Penelope Banou⁺

Northumbria University, Newcastle, UK
University of West Attica, Athens, Greece

⁺ Presenting and corresponding author

email: Penelope.banou@northumbria.ac.uk

Varnish removal on works of art on paper. Evaluating the results of gel applications

Varnishing works of art on paper is not a common practice but it has been occasionally applied on maps, globes, prints, wallpaper, paintings, drawings and photographs, both for practical and aesthetic purposes. Varnish removal can be a complex and challenging process considering its effects on printed or coloured media, as well as the paper support.

Within the framework of the GREENART project, the application of green fluids and gels has been employed for varnish removal from prints on paper, providing the opportunity to re- evaluate and compare “traditional” or conventional methods used in paper and painting conservation. The outcome of the trials will be presented and discussed, offering new insights into varnish removal techniques in paper conservation.

Penelope Banou holds a PhD in Conservation of Antiquities and Works of Art (University of West Attica, Greece, 2024), a B.A. degree in Conservation of Fine Art (University of Northumbria at Newcastle, UK, 1998), and a B.A. degree in Conservation of Antiquities and Works of Art (TEI of Athens, Greece, 1996). Since 2022, she has been a lecturer in the MA Conservation of Fine Art program, Northumbria University, UK. From 1998 until 2008 she worked as a freelance paper conservator collaborating with museums, private and public collections. Following that, she worked as a paper conservator at the Conservation Department of the General State Archives of Greece in Athens from 2008 to 2022. She has been involved in several conservation and research projects, with several publications for the last 20 years.

Martina Vuga⁺ and Lucija Močnik Ramovš⁺

University of Ljubljana, Academy of Fine Arts and Design, Ljubljana,
Slovenia

⁺ Presenting and corresponding authors

email: Martina.Vuga@aluo.uni-lj.si
and Lucija.MocnikRamovs@aluo.uni-lj.si

Some observations on the new cleaning systems used for varnish removal

The authors will present the results of testing some traditional methods and materials in comparison with newly developed gels and nanofluids for natural varnish removal. The testing was carried out on a polychrome wooden sculpture from the 19th century and on two oil paintings on canvas, where the coloured surfaces were differently sensitive to solvents. The surface of the sculpture was quite structured, and the varnish accumulated mainly in the depth of the brush strokes. On the paintings, the choice of methods and materials followed requirements such as gradual removal of varnish, minimal impact on the colour layer and full control on darker surfaces.

The tested materials were evaluated according to five criteria: ease of preparation, number of applications, removal/rinsing gel, adaptation to the surface, ease of application, effectiveness of varnish removal.

Martina Vuga is Assistant Professor of Conservation at the University of Ljubljana, Academy of Fine Arts and Design (ALUO) from study year 2020/21. She obtained her BA and MA degrees in Conservation Restoration from University of Ljubljana. She attended many professional courses, workshops, conferences in Slovenia and abroad. Between 2005 to 2021, she was employed as a sculpture conservator at the National Gallery in Ljubljana, from 2014-2020 she was also the Head of the Conservation Restoration Department. Her main research interests are the conservation of cultural heritage made of wood or plaster and also materials and methods for conservation. She has been (and is) involved in European project Erasmus + KA203 – Strategic Partnerships for Higher Education; Reformation of Education on Wood Preservation _ Re/Forma Viva (2019-2021); a national research project Stucco marble altars in Slovenia: materials, conservation, and meaning (2023-2026) and Greenart project.

Lucija Močnik Ramovš graduated in painting in 1996 at the Academy of Fine Arts and Design, University of Ljubljana, and in 1999 she completed her Master's Study in Conservation/Restoration. She is Professor at the Academy of Fine Arts and Design, University of Ljubljana, in charge of the courses in conservation/restoration of paintings on canvas. She is a member of expert committees of the Ministry of Culture of the Republic of Slovenia and the Association of Slovene Restorers. In her professional work, she mainly focuses on oil paintings on canvas and, in close cooperation with the Restoration Centre of the Institute for the Protection of Cultural Heritage, she had also carried out specialist training workshops.

Soraya Alcalá⁺¹
Maria Laura Petruzzellis²,
Silvia Russo¹,
Luciano Pensabene Buemi²,
and Per Knutås¹

¹The Museum Of Fine Arts, Houston, Texas, USA

²Peggy Guggenheim Collection, Venice, Italy

⁺ Presenting and corresponding author

email: salcala@mfa.org

Assessing sustainable hydrogels to mitigate discoloration in cotton canvas artworks

This contribution presents the initial phase of evaluating four greener hydrogels aimed at developing a treatment protocol for reducing discoloration on unprimed cotton duck canvases; Kenneth Noland's *Eyre* (1962) and Morris Louis's *Slides* (1962), both exemplary works of American Color Field painting. These artists are renowned for their innovative use of diluted acrylic paints to stain unprimed cotton duck canvas, which has resulted in significant discoloration and uneven staining due to the oxidation of the cellulosic material. This condition necessitates a gentle cleaning method that can effectively reduce staining and discoloration without leaving visible tidelines or stark borders that may become pronounced over time.

While previous research has focused on hydrogels for cleaning sensitive painted surfaces, less attention has been paid to their effectiveness in addressing cellulosic degradation products and stains on unprimed canvas. To investigate this, we selected a naturally aged 'test' cotton canvas exhibiting pronounced discoloration and 'foxing'-like spots. A range of buffered aqueous solutions was formulated, varying in pH, conductivity, and active ingredients, to be loaded into the four hydrogels. These parameters specifically targeted the cleaning needs of unprimed cotton duck canvases and serve as a foundation for future applications.

The results emphasize that the success of the treatment depends not only on the choice of cleaning solution and hydrogel but also on the careful definition of the treatment protocol itself. A well-structured protocol is crucial in achieving effective results. To further investigate this, comparative tests were conducted in collaboration with the Peggy Guggenheim Collection, which houses similar works with comparable conservation challenges. Based on these findings, we offer recommendations for the application and use of each hydrogel, highlighting the practical implications of this research for conservators and its contribution to the ongoing push for sustainable practices in art conservation.

Soraya Alcalá is a paintings conservator currently working at the Museum of Fine Arts, Houston as a head of the paintings conservation lab. Previously, she worked as a conservator at the American Museum of Natural History, New York; Opera della Primaziale Pisana, Italy; the National Museum of Art of Catalunya, Spain; The Victoria and Albert Museum, U.K., as well as leading a private practice for almost ten years while living in N.Y.

Soraya obtained her B.A. in Conservation of Cultural Heritage at the University of Barcelona, Spain, and an MSc in Materials and Diagnostic Techniques of Cultural Heritage at the Department of Chemistry and Industrial Chemistry at the University of Pisa, Italy. Soraya's research focuses on the invention of innovative cleaning techniques.

She organizes workshops teaching cleaning sensitive materials and gels systems to mid-careers conservators. She consulted and carried out cleaning treatments for different institutions and private practices.

Laura Maccarelli⁺ and Jessica Chasen⁺

The Los Angeles County Museum of Art, Los Angeles, California, USA

⁺ Presenting and corresponding authors

email: lmaccarelli@lacma.org and jchasen@lacma.org

The LACMA Case study: application of several green gels to polychrome surfaces

The Los Angeles County Museum of Art (LACMA) has recently undertaken innovative studies as part of the EU Horizon 2020 GREENART project to beta-test greener cleaning solutions for painted and gilded surfaces in its collection. Two key case studies—the Damascus Room and a selection of Tibetan furniture—demonstrate the potential of these new methods while addressing shared conservation challenges, including the removal of surface soiling and degraded coatings without compromising delicate original materials.

The Damascus Room, dating to 1766, and LACMA's collection of Tibetan furniture, including approximately 30 pieces from the Hayward Family Collection, both highlight the difficulty of cleaning water-sensitive painted surfaces or intricate gilded designs obscured by layers of grime or tacky coatings. Traditional cleaning methods often involve petroleum-derived solvents that raise environmental and health concerns. As part of the GREENART project, greener cleaning materials, such as nanogels and aqueous solutions with delivery systems like xanthan gum and agarose gels, were tested for their ability to address these issues sustainably. Analytical techniques including FTIR, UVF imaging, SEM/EDS, XRF, Raman spectroscopy, and colorimetry were employed to evaluate the efficacy of these methods and to characterize both original materials and later-applied coatings. These findings not only inform practical cleaning strategies for sensitive surfaces but also emphasize the importance of environmentally conscious conservation practices.

Through these parallel studies, LACMA underscores its commitment to advancing sustainable conservation methods that balance preservation goals with broader environmental responsibilities. By integrating innovative cleaning technologies, the museum contributes to the development of greener approaches to the care of culturally significant objects.

Jessica Chasen earned a Master of Science in Art Conservation from Winterthur / University of Delaware with a specialization in Objects and a minor in Painted Surfaces. Her graduate work included internships at the Museum of Modern Art in New York, the Rijksmuseum, and the Brooklyn Museum. She is currently an objects conservator at the Los Angeles County Museum of Art. Prior to her time at LACMA, Jessica was an assistant conservator at the J. Paul Getty Museum and the Getty Conservation Institute.

Laura Maccarelli is the Andrew W Mellon Head Scientist within the scientific research group at LACMA. Prior to her time at LACMA, she held a brief internship at The National Trust as well as Heritage Malta. She graduated with a M.Sc. in Conservation Science from the University of Bologna. At LACMA her work focuses on material identification of art objects, in addition to being involved in external research projects focusing on paintings, 3D objects and work on paper. Her passion is to research natural organic dyes on textiles using destructive and non-destructive techniques.

WORKSHOP 1

Giovanna Poggi[#]

University of Florence, Florence, Italy

Trainer

email: poggi@csgi.unifi.it

Innovative green gels for the cleaning of works of art

- Introduction to gels
- Innovative gels developed within GREENART
- Demonstration of gels features and handling
- How to apply gels in conservation practice
(also loaded with innovative green fluids)

Giovanna Poggi holds a Ph.D. in Science for Cultural Heritage Conservation from the University of Florence under the mentorship of Prof. Piero Baglioni. She worked as a postdoctoral fellow at Center for Colloid and Surface Science (CSGI) in the framework of the European Projects FP7 NANOFORART, H2020 NANORESTART, H2020 APACHE, ERC GraphenART and HORIZON EUROPE GREENART. She is currently a fixed-term researcher (RTDb) in physical chemistry at the Chemistry Department of the University of Florence. Her research mainly deals with the synthesis and characterization of nanoparticles and their application to paper and wood deacidification and to carbonate-based matrices consolidation. She has recently started working on the development and characterization of hydrogels and organogels for the cleaning of works of art and on the development and use of biocompatible polymers in several applicative fields.

WORKSHOP 2

Camilla H. M. Camargos^{#1} and Camila A. Rezende^{#2}

¹ Federal University of Minas Gerais (UFMG),
Belo Horizonte – MG, Brazil

² University of Campinas (UNICAMP), Campinas – SP, Brazil

Trainers

email: camillahmc@ufmg.br and camilaiq@unicamp.br

Nanocellulose/nanolignin protective coatings and nanocellulose/biopolymer hydrogess

- Overview of the properties and handling of nanocellulose- and nanolignin-based materials for cultural heritage conservation
- How to apply water-based nanocellulose coatings on aged and unaged cellulosic substrates
- How to apply nanocellulose/biopolymer hydrogels to remove artificial soil or aged adhesives from smooth or rough mock-up surfaces

Camila Alves de Rezende is an Associate Professor at the Institute of Chemistry at UNICAMP. She holds a Bachelor's degree (2002), a Teaching degree (2003), a Master's degree in Chemistry (2004), and a PhD in Science (2007) from UNICAMP. Prof. Rezende completed her doctoral internship (2006) and postdoctoral research (2007-2008) at the Léon Brillouin Laboratory in France, followed by additional postdoctoral work at the Institute of Chemistry at UNICAMP and the Institute of Physics at São Carlos (USP). She also had the opportunity to work as a visiting researcher at the Centre for Novel Agricultural Products (CNAP) at the University of York (2017). Throughout her career, she has contributed to various projects and gained expertise in colloidal and surface chemistry, polymers and nanoparticles, polymer blends and nanocomposites, biofuels, and the extraction of compounds from plant biomass. At UNICAMP, she coordinates the Laboratory of Biomass Chemistry and Morphology (LaQuiMoBio), focusing on the extraction of

cellulose and lignin from plant biomasses for the production of fibers and nanoparticles. Her research explores their applications in polymer composites and nanocomposites, coating films, aerogels or solid foams, hydrogels, and cosmetics.

Camilla Henriques Maia de Camargos is an Assistant Professor in the Conservation and Restoration of Cultural Heritage program at the School of Fine Arts, UFMG. She holds a PhD in Science (Physical Chemistry) from the Institute of Chemistry at UNICAMP (2021) and completed a doctoral internship at the Department of Chemistry at the University of Florence (2020). She earned a Master's degree in Chemistry (Physical Chemistry) from the Department of Chemistry at UFMG (2016) and a Bachelor's degree in Conservation and Restoration of Cultural Heritage from the same institution (2013). Camilla has conducted short-term postdoctoral research at the University of Florence (2022), the Federal University of Pelotas (UFPeL, 2022-2023), and UNICAMP (2023-2024). Her work focuses on investigations and treatments related to the conservation and restoration of books, documents, and works of art on paper, with an emphasis on interdisciplinary studies applying chemistry to the characterization and deterioration processes of cellulosic substrates. Additionally, she develops advanced materials and sustainable nanotechnologies for the conservation of cultural heritage.

WORKSHOP 3

Francesca Boccaccini[#]

CNR, Istituto per lo Studio dei Materiali Nanostrutturati, Rome, Italy

[#] *Trainer*

email: francescaboccaccini@cnr.it

Sustainable protective coatings for metal cultural objects: properties and application

- Introduction to the novel sustainable coatings: benefits and challenges of biopolymer-based materials
- How to apply the protective materials on mock-ups with different composition and surface finish
- Demonstration of the aesthetic properties and reversibility
- Application on metal objects

Francesca Boccaccini, PhD in Earth Sciences, Environment and Cultural Heritage, is a research fellow at CNR-ISMN of Rome. Her expertise spans materials science, environmental sustainability, and cultural heritage preservation, with a particular focus on the conservation of metal objects. Currently, she is involved in the EU-funded GREENART project, where she is developing, studying, and validating innovative protective coatings based on sustainable biopolymers and aimed at ensuring the long-term preservation of works of art.

WORKSHOP 4

Manfred Anders[#] and Katharina Schuhmann[#]

ZFB Zentrum für Bucherhaltung GmbH, Leipzig, Germany

[#] Trainers

email: anders@zfb.com and schuhmann@zfb.com

Integration of sustainable raw materials, novel regulators and sensing devices in archive box production

- Examples of customized storage solutions for special applications in archives / museums will be presented
- Improved box constructions will be presented
- Sustainable raw materials will be demonstrated
- The utilization of an integrated T/RH sensor transponder can be tested
- Modular combinability of green acid/VOC absorbents or antifungal materials with the storage enclosures will be demonstrated and can be tested

Manfred Anders is specialist for paper-, cellulose- and textile chemistry. He received his PhD “Analysis of paper ageing and preservation of damaged papers by deacidification and consolidation” at the University of Stuttgart in 2000, held teaching assignments in Reutlingen and Hildesheim and has been a member of the IADA board from 1999–2007. Since 2002 he works as CEO and head of R&D of ZFB ZENTRUM FÜR BUCHERHALTUNG GmbH.

Katharina Schuhmann is an engineer for printing and packaging technologies and joined ZFB ZENTRUM FÜR BUCHERHALTUNG GmbH in 2015, where she works as researcher for active and preventive conservational product and process innovation.

WORKSHOP 5

Andrea Casini[#]

CSGI Center for Colloid and Surface Science, Florence, Italy

Trainer

email: andrea.casini@unifi.it

Art conservation goes green: sustainable and "green" cleaning fluids with low impact solvents and surfactants

- The shift toward sustainable conservation
- Guidelines for a "greener" selection
- Innovations in green cleaning solutions
- Practical use and impact on conservation workflows

Andrea Casini earned his PhD in Chemistry (Science for Cultural Heritage Conservation) from the University of Florence in 2022. He is currently a postdoctoral researcher at CSGI (Center for Colloid and Surface Science). Since 2018, his research has focused on biopolymer-based nanoconsolidants, nanostructured fluids for the removal of unwanted layers from artistic surfaces, and advanced gel systems for cleaning modern and contemporary paintings. He is a member of the research team for the European project GreenArt, which investigates sustainable materials for cultural heritage conservation. Additionally, he contributes to CSGI-Solution for Conservation of Cultural Heritage, a project aimed at creating a startup to commercialize formulations developed within European projects by CSGI.

MULTIMEDIA ROOM

List of videos: Missing

GREENART

GREEn ENdeavour in Art ResToration

ORGANISATION

Éléonore Kissel, musée du quai Branly — Jacques Chirac
Antonio Mirabile, GREENART project



MUSÉE DU QUAI BRANLY
JACQUES CHIRAC

"Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them."

