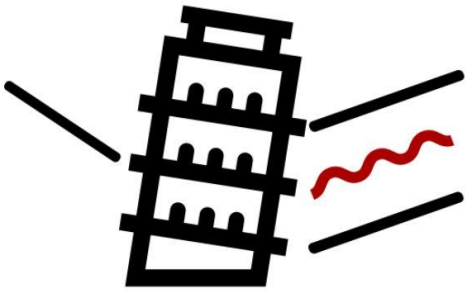

RAA 2025

International Conference on the Application of
Raman Spectroscopy in Art and Archaeology
Pisa, 1-6 September 2025

Application of Raman Spectroscopy in Art and Archaeology

CHAIR OF THE CONFERENCE

Simona Raneri, University of Florence;
Stefano Legnaioli, CNR-ICCOM.

SCIENTIFIC COMMITTEE

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INDEX

Plenary Session

Wednesday 3rd September 2025 Aula magna [17:20 - 18:10]

Innovative methodological and technological insights to Raman spectroscopy applied in the field of Cultural Heritage (in the memory of Prof. Austin Nevin)

Iacopo Osticioli

Institute of Applied Physics "Nello Carrara" (IFAC-CNR), Florence (Italy)

Raman is a well-established spectroscopic technique which has found its place in many analytical laboratories dedicated to different fields of applications. In particular, the capability to recognize the molecular composition of a great variety of materials in a non-destructive and non-invasive manner makes Raman spectroscopy a leading technique in the field of Cultural Heritage. However, the low signal intensity, the interference with other emission sources, and the risk of inducing photothermal effects during measurements push always scientists to find innovative solutions to make this technique more efficient and widely applied.

A selection of some significant published and unpublished (recent) research works and projects will be discussed in detail considering the five Raman sessions proposed at the conference: the application of chemometrics to Raman data to highlight subtle differences among the spectra as well as the conceptualization of innovative technological and instrumental solutions to solve specific conservation issues will be presented. Moreover, non-conventional analytical approaches and protocols of measurements to improve the identification and characterization of problematic artistic materials to be detected by using Raman spectroscopy will be discussed. Most of these research works bring the significant contribution of Prof. Austin Nevin, who passed away last year. This plenary is also the occasion to celebrate his memory by recalling his research activity focused mainly on Raman spectroscopy applied to the Cultural Heritage field and to try to transmit to the audience his professional attitude capable of addressing complex technical and conservative issues due to his strong scientific background.

Sponsors Communications

Wednesday 3rd September 2025
[15:10 - 15:30]
Riccardo Brandiele, Metrohm
Metrohm Raman Product, the new instrument for the Art and Archaeology Raman analysis.

Wednesday 3rd September 2025
[17:00-17:20]
Riccardo Tagliapietra, Renishaw
Simultaneous and colocalised Raman and SEM imaging for correlated multimodal analysis.

Thursday 4th September 2025
[11:10-11:30]
Diego Sali, Bruker
Raman Imaging Spectroscopy: future is now.

Thursday 4th September 2025
[14:50-15:10]
Andrea D'Alessandro, Shimadzu
Multimodal Spectroscopic Analysis of Egyptian Royal Sarcophagi Samples Using Shimadzu AIRsight.

Thursday 4th September 2025
[17:10-17:30]
Alessio Bruttomesso, Optoprim
Enhancing Raman Analysis with Compact, Microscopic, and Ultrafast Tools.

Friday 5th September 2025
[11:10-11:30]
Matthias Finger, Oxford Inst.
Resolving the Arts: Applications of Confocal Raman Imaging and Portable Raman Microscopy.

Events

- **OPENING CEREMONY**
  Wednesday 3rd September 2025

  Palazzo Matteucci, University of Pisa
  [09:00-09:30]

- **MUSEUM GUIDED TOUR**
  Friday 5th September 2025

  The Miracle Square and its monuments (leaning tower excluded)
  [16:00-18:00]

  Botanic garden and Botanic Museum, University of Pisa
  [16:00-18:00]

  National Museum of San Matteo
  [16:00-18:00]

  Palazzo Blu Museum - permanent exhibition
  [16:00-18:00]

- **POST-CONFERENCE TRIP**
  Saturday, 6th September 2025

  Studi D'Arte Cave Michelangelo, Via Piave, 32 - 54033, Carrara - Italy

Session List

S1. Raman spectroscopy for characterization, diagnosis and conservation of Cultural Heritages

Wednesday 3rd September 2025 [09:30-11:30 – oral presentations]

Wednesday 3rd September 2025 [11:30-12:30 – poster session]

Thursday 4th September 2025 [15:50-17:10 – oral presentations]

S2. Combined approaches

Wednesday 3rd September 2025 [13:30-15:10 – oral presentations]

Wednesday 3rd September 2025 [16:00-17:00 – oral presentations]

Thursday 4th September 2025 [09:30-10:50 – oral presentations]

Thursday 4th September 2025 [11:30-12:30 – poster session]

S3. Non-conventional methods: SORS, SERS, Synchrotron Radiation methods

Thursday 4th September 2025 [13:30-14:50 – oral presentations]

Thursday 4th September 2025 [11:30-12:30 – poster session]

Friday 5th September 2025 [11:30-12:30 – poster session]

S4. Technical innovation, mapping, wide-field Raman spectroscopy, field in situ methods

Friday 5th September 2025 [09:30-11:10 – oral presentations]

Friday 5th September 2025 [11:30-12:30 – poster session]

S5. Chemometric, multivariate data analysis techniques, machine learning methods, open data

Thursday 4th September 2025 [10:50-11:10 – oral presentations]

Friday 5th September 2025 [11:30-12:30 – poster session]

September 3rd, 2025

RAA 2025

Application of Raman Spectroscopy in Art and Archaeology

Oral Presentations

S1. Raman spectroscopy for characterization, diagnosis and conservation of Cultural Heritages

Wednesday 3rd September 2025 [09:30-11:30]

Chairs: Peter Vandenabeele, Claudia Conti

09:30 - 09:50	Alberico et al., Preparative technique of Polychrome Floors at the Royal Palace of Caserta
09:50 - 10:10	Castro et al., Degradation of the Herculaneum dagger due to an obsolete conservation treatment
10:10 - 10:30	Philippides, Studying light-induced alterations in inorganic pigments through Raman microscopy
10:30 - 10:50	Richter et al., Artificial arsenic sulphide pigments used in Juan Bautista Maíno's Pentecostés (1612-14): new findings revealed with the aid of Raman micro-spectroscopy
10:50 - 11:10	Wang et al., Complementary use of the Raman and XRF techniques for in situ non-destructive analysis of the architectural decorative patterns of Prince Kung's Palace (Beijing, China)
11:10 - 11:30	Madariaga et al., Sulfates in Cultural Heritage: Raman spectroscopy as a key analytical tool

S2. Combined approaches

Wednesday 3rd September 2025 [13:30-15:10]

Chairs: Laura Fornasini, Laszlo Aradi

13:30 - 13:50	Alp et al., How „Bravo" is the handheld Raman? A critical evaluation of its efficiency on investigating facades of the Berlin Modernism Housing Estates
13:50 - 14:10	Puntin, Mixing Colours: a multi-analytical study of roman pigments from a coastal and an island archaeological site

14:10 - 14:30	Rygula et al., The extraordinary richness of pigments in Flemish miniatures on parchments. Non-invasive analysis with Raman spectroscopy, XRF, and RIS.
14:30 - 14:50	Musa et al., Geology straddling art: a multi-technique study of the Taramelli's watercolors
14:50 - 15:10	Zatti et al., Reconstructing blue pigment production technology in the 17th-18th centuries Pavia majolica manufacture: a multi-technique approach

S2. Combined approaches

Wednesday 3rd September 2025 [16:00-17:00]

Chairs: Barbara Llydzba-Kopczynska, Ludovic Bellot-Gurlet

16:00 - 16:20	Puglieri et al., Tikuna Blue: Chemistry of an Unknown Colorant from the Amazon Forest
16:20 - 16:40	Martiniello et al., The Zabargard peridots from the Crux Vaticana to the Holy Cross of Castiglion Fiorentino
16:40 - 17:00	Aradi et al., Garnet Provenance of Polychrome Jewellery from the Migration Period in the Carpathian Basin: the role of Raman spectroscopy

Plenary talk

Wednesday 3rd September 2025 [17:20-18:10]

Chair: Danilo Bersani

17:20 - 18:10	Ostricioli, Innovative methodological and technological insights to Raman spectroscopy applied in the field of Cultural Heritage (in the memory of Prof. Austin Nevin)

Poster Session

S1. Raman spectroscopy for characterization, diagnosis and conservation of Cultural Heritages

Wednesday 3rd September 2025 [11:30-12:30]

Castro et al., Raman Spectroscopy combined with hyperspectral image to evaluate the consolidation efficiency of Nanoparticle-Based formulations

Dimitrova et al., Portable Raman spectroscopy and X-ray fluorescence for the in situ characterization of the parchment, inks, and pigments of medieval manuscripts at the Bulgarian National Library

Lesigyarski et al, Stamp decorated black and red late antique pottery from Bulgaria characterized by Raman and pXRF spectrometry

Yancheva et al, A spectroscopic study on the painting materials and technique in a frontal panel wall of a festival chariot from Kerala, South India

Pirovska et al., Raman Spectroscopy for Identifying Pigment Compounds: A Case Study of White Inlaid Pottery Decoration from Bulgaria at the Beginning of the First Millennium BC

Valadas et al., A multidisciplinary study for the identification and characterization of the repaint layers from the Viceroys gallery in Goa: the contribution of Raman Spectroscopy (in situ and micro)

Vandenabeele et al., Shedding light on Medieval Burial vaults from Bruges, Belgium: A combined Raman spectroscopy approach (in situ and laboratory) for pigment characterization

Zlateva et al., Multi-analytical approach for the identification of organic material stored at ceramic pots from the Antiquity – a case study from South-West Bulgaria

RAA 2025

Application of Raman Spectroscopy in Art and Archaeology

Oral Presentations

S2. Combined approaches

Thursday 4th September 2025 [09:30-10:50]

Chairs: Armida Sodo, Kepa Castro

09:30 - 09:50	Aspiotis et al., Multilayered secrets of the past: non-invasive material analysis of Egyptian scarabs, scaraboids and shabtis through XRF, Raman spectroscopy and CT scanning
09:50 - 10:10	Deledonne et al., Raman micro-analysis for discriminating superimposed historical inks in a non-invasive and multi-analytical approach
10:10 - 10:30	Penetra et al., Biochemical Signatures of Historical Parchment: Insights into Parchment Origin and Degradation
10:30 - 10:50	Sanchez et al., MRS and μXRF for the analysis of vitreous lead slags reused in the production of Roman mosaic tesserae in the Upper Guadalquivir Valley (Jaén, Spain)

S5. Chemometric, multivariate data analysis techniques, machine learning methods, open data

Thursday 4th September 2025 [10:50-11:10]

10:50 - 11:10	Zhang et al., Deep learning-assisted portable Raman spectroscopy for wood identification in historical wooden collections of the Palace Museum

S3. Non-conventional methods: SORS, SERS, Synchrotron Radiation methods

Thursday 4th September 2025 [13:30-14:50]

Chairs: Eugenia Tomasini, Iacopo Ostricioli

13:30 - 13:50	Santiglia et al., Advanced Raman Analysis of Textile Fragments from the Ryazan-Oka Culture: Application of the SERS Technique for Archaeological Study
13:50 - 14:10	Bilbao Zuburi et al., Dye analysis on historical textiles by Raman and Surface-Enhanced Raman Spectroscopies: a focus on resonance phenomena
14:10 - 14:30	Monteiro Pinto et al., Exploring the Photodegradation of Purple Textiles via SERS and Steady State Spectroscopy
14:30 - 14:50	Conti et al., Expanding SORS frontiers: new perspectives for Heritage Science

S1. Raman spectroscopy for characterization, diagnosis and conservation of CH

Thursday 4th September 2025 [15:50-17:10]

Chairs: Eva Mariasole Angelin, Aggelos Philippidis

15:50 - 16:10	Barroso et al., Polychromy, classification, and firing temperature of pre-Roman glass beads in the Iberian Peninsula and Balearic Islands
16:10 - 16:30	Rigon et al., Raman investigation on Abies alba Miller wood samples to test cellulose nanocrystalline (CNC) as a sustainable material for the conservation of ancient wood
16:30 - 16:50	Marotta et al., Assessing copper-based and lead-based pigments deterioration in Early Islamic manuscripts by means of Raman spectroscopy
16:50 - 17:10	Sardara et al., Multi-analytical approach for the characterization of earthy encrustation collected from authentic and forged ceramic vessels for artworks authentication

Poster Session

S2. Combined approaches

Thursday 4th September 2025 [11:30-12:30]

Aradi et al., Archaeometric analysis of medieval enamelworks from Hungary (Árpádian period, 10th-13th century)

Bellot-Gurlet et al., Synthesis of Egyptian Blue starting from Roman coins: characterization of modern products and comparison with archaeological samples

Kouloumpi et al., Contribution of Raman Spectroscopy in the Physicochemical Documentation of the Paintings' Collection of the National Gallery – Alexandros Soutsos Museum, Greece

Lydzba Kopczynska et al., Raman analysis assisted by invasive TLC and LC-MS in categorisation of red inks

Madariaga et al., New findings in Levantine rock art: The case of the Rambla de la Huerta de Mateo II rock shelter, Minglanilla, Cuenca (Spain)

Pasetti et al., XRF, XANES and Raman combined for chromophore quantification in tourmaline gemstones

S3. Non-conventional methods: SORS, SERS, Synchrotron Radiation methods

Platania et al., Surface Enhanced Raman Spectroscopy of drying oils

September 5th, 2025

RAA 2025

Application of Raman Spectroscopy in Art and Archaeology

Oral Presentations

S4. Technical innovation, mapping, wide-field Raman spectroscopy, field in situ methods

Friday 5th September 2025 [09:30-11:10]

Chairs: Jana Striova, Yun Zhang

09:30 - 09:50	Bersani et al., Non-destructive analysis of Roman rings with gems coming from the necropolis of Lovere (North of Italy)
09:50 - 10:10	Angelin et al., A rare medieval palette: identification and provenance of natural crocoite (PbCrO4) in the wall paintings of Brandenburg Cathedral Cloister (Germany)
10:10 - 10:30	Pinto et al., Development of a multi-analytical database, enhanced motorization for in situ techniques, and open-source workflows for the study of historical pigments by Raman spectroscopy
10:30 - 10:50	Righetti et al., Hardware-Integrated Sequentially Shifted ExcitationTM Macro-Raman and 3D Mapping System for the Characterisation of Artwork Surfaces
10:50 - 11:10	Vandenabeele, Macro-Raman Mapping of Artworks

Poster Session

S3. Non-conventional methods: SORS, SERS, Synchrotron Radiation methods
S4. Technical innovation, mapping, wide-field Raman spectroscopy, field in situ methods
S5. Chemometric, multivariate data analysis techniques, machine learning methods, open data

Friday 5th September 2025 [11:30-12:30]

Cristina et al., Raman Data Processing for Large Maps of Iron Corrosion Using Non-Negative Matrix Factorization

Gros et al., μ-Raman surface mapping of antique silver coin.

Lydzba Kopczynska et al., Machine Learning Approach to Amber Provenance: Bridging Traditional Analytical Methods and Advanced Computational Techniques.

Musa et al., Different colors, same pigment: the antique science beyond the lead-antimoniate used by ancient Roman glass-makers revealed by a multitechnique study of Aquileia archaeological Museum‘s glass-gems collection.

Britton et al., Comparative Analysis of Data Processing Techniques for Macro-Raman Mapping in Art Analysis

Vermeersch et al., Through the looking glass: pigment characterization of an Archaic Female Head Statue (Late 6th BC)

Vermeersch et al., Exploring the use of Bravo (Bruker) instrumentation for in situ measurements

General Scheduling

1st September 2025	2nd September 2025	3rd September 2025	4th September 2025	5th September 2025	6th September 2025
RAA2025 School Spectra Revealed: Raman Spectroscopy for Art and Archaeology	RAA2025 School Spectra Revealed: Raman Spectroscopy for Art and Archaeology	Registration 08:00-09:00	Oral Session [S2, S5] 09:30-11:10	Oral Session [S4] 09:30-11:10	Post Conference Trip 08:00-14:00
		Open Ceremony 09:00-09:30	Sponsor Talk 11:10-11:30	Sponsor Talk 11:10-11:30	
		Oral Session [S1] 09:30-11:30	Poster Session [S2, S3] 11:30-12:30	Poster Session [S3, S4, S5] 11:30-12:30	
		Poster Session [S1] 11:30-12:30	Lunch break 12:30-13:30	Conclusions 12:30-13:00	
		Lunch break 12:30-13:30	Oral Session [S3] 13:30-14:50	16:30-18:30 Museums Guided Tour	
		Oral Session [S2] 13:30-15:10	Sponsor Talk 14:50-15:10		
		Sponsor Talk 15:10-15:30	Coffee Break 15:10-15:50		
		Coffee Break 15:30-16:00	Oral Session [S1] 15:50-17:10		
		Oral Session [S2] 16:00-17:00	Sponsor Talk 17:10-17:30		
		Sponsor Talk 17:00-17:20	Social Dinner 20:00		
		Plenary talk 17:20 - 18:10			
	Icebreaker Party 18:00-19:00	Wine Tasting 18:10-19:00			