

PERSONAL INFORMATION

Emma Cantisani

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POSITION

Senior Researcher at Institute of Heritage Science (ISPC) – CNR National Research Council of Italy

EDUCATIONAL LEVEL

PhD in Science for Conservation of Cultural Heritage (University of Florence)

WORK EXPERIENCE

01/01/2023–today

Senior Researcher at Institute of Heritage Science (ISPC) - National Research Council of Italy

Staff Heritage Materials Science

Staff Novel approaches and technologies for Heritage Conservation Lab

Member of the Board of Institute of Heritage Science (2020-2024)

Main research activities:

- Combination of material science methodologies with archaeological and architectural issues to understand the criteria for the selection of raw materials, production technologies, durability and sustainability of ancient materials.
- X-ray based and spectroscopic advanced techniques applied to cultural heritage materials (mortars, plasters, stones, ceramics, metals, pigments, glasses, wood) for archaeometric and conservation purposes.
- Development of procedures and application of spectroscopic techniques for selection of anthropogenic calcite in mortars for radiocarbon dating.
- Investigation of the decay mechanisms of architectural and archaeological materials.
- Development of sustainable methodologies and products for the restoration and conservation of cultural heritage.
- Mineralogical, petrographic, physical and mechanical characterization of natural and artificial lapideous stones.
- Study of the relationship between raw materials and the quality of mortars and plasters, with particular attention to the study of ancient and modern binders.
- Archaeometric studies on white and coloured marbles.
- Archaeometric studies on pigments, ceramics, metals and glasses.

02/11/2009 – 31/12/2022

Researcher (permanent position)
National Research Council of Italy (CNR)
Institute for Conservation and Valorisation of Cultural Heritage (from 1/10/2019 ISPC
Institute of Heritage Science).

Main recent research projects:

- **ESRF Proposal, HG-268 BM08 (2026)** Blackening of red cinnabar and malachite in historical Roman wall paintings: speciation of Hg and Cu by means of FY-TEY XAS mapping. 15 shifts. Role: Participant

- **2024- 2026 TANTRIC** Traditional Knowledge for the Conservation of the Silk Roads Monumental Terracuda Sculptures MSCA project Funded by: European Union Call: HORIZON-MSCA-2022-PF-01. Role: Supervisor

- **2025-2026 Velathri Volterra Augmented Reality** founded by Regione Toscana in the framework of PR FESR 2021-2027, Line 1.1.4 Research and development for enterprises also in partnership with research organisations. Role: Participant

- **2024-2025 Laboratori Archeologici Congiunti.** The Spool-LAB. An Interdisciplinary Research to Investigate the Iron Age Clay Spool-Shaped Objects from Tille Höyük, South-Eastern Anatolia. Role: Participant

- **ESRF Proposal HG-217, BM08 (2023)** The origin of the blue colour of protohistoric vitreous materials from Paduli (Colli sul Velino, Rieti, Italy). 18 shifts. Role: Participant

- **2023-2025 PRIN 2022** Marginal landscapes and production processes along the Reno and the Bisenzio-Sieve valley districts during the 1st millennium BC. Role: Participant

- **2025 “Cultural Heritage Active Innovation for Sustainable Society (PNRR project CHANGES)”** -Spoke 5 - Science and technologies for sustainable diagnostics of Cultural Heritage, WP1 - Advanced non-invasive methods for sustainable diagnostics in Heritage Science; Spoke 8 Sustainability and resilience of tangible cultural heritage, WP3 Actualization. Role: Participant

-**2021-2025 ACROSS** ArChaeology, inventory of RecOnstruction, Seismology and Structural engineering”. The project is founded by the Agence Nationale de la recherche France, ANR-20-CE03-0003. Role: Task Leader

-**2020-2022 SMART4CH2** Interoperative Framework for the management of planned and predictive conservation of cultural heritage through integrated enabling technologies. The project is founded by: Regione Toscana, Call FAR-FAS 2014 Call for joint projects of higher education through the activation of research grants in the cultural field. Role: WP leader

-**2017-2019 CNR Bilateral project** with Polonia: “Wet archaeological wooden material: multi-analytical approach for decay diagnosis” with CNR/PAS (Polish Academy of Sciences Polonia). Role: Scientific coordinator.

- **2023-2025 DUS.AD015.373 CNR Research Project** - Methods for knowledge and conservation of architectural, monumental and archaeological heritage. Role: Scientific coordinator of the research line: Natural and artificial stone materials, archaeological ceramics and glass: methods for archaeometry and conservation

-**2019-2023 DUS.AD015.274 CNR Research Project:** Archaeometry and

archaeometallurgy studies. Role: Scientific coordinator

-2018-2020 4D-HyperSpectralCube. Transportable System for Hyperspectral Imaging from IR to X-ray. Founded by Regione Toscana. POR FESR 2018-2020. Strategic Research and Development Projects of MPPIs. Role: participant

-2018-2020 ARCO-CNR, Smart monitoring of Cultural Heritage. Predictive maintenance of architectural materials through integrated enabling technologies. Founded by Regione Toscana POR FSE 2014-2020. Role: participant

-2017-2020 MOS project. Investigations on the historical ornamental materials of Tuscany: types, origin, use, perspectives for the drafting of the new quarry plan. Founded by Regione Toscana. Role: participant.

-2022 DUS.AD015.352 Diagnostic Campaign for the assessment of the state of conservation of the Sculptures of the Bacino del nettuno and the Bacino dell'Isola at the Boboli Gardens (founded by Uffizi Gallery). Role: Scientific coordinator

- 2018-2019 DUS.AD015.151 Villa Medicea di Cafaggiolo. Diagnostic campaign on the plasters and some external decorative elements of the Villa of Cafaggiolo. Role: Scientific coordinator

- 2018-2019 DUS.AD015.178 Cappella Sant'Agata (Pisa). Mineralogical, petrographic and chemical investigations on samples from the wall facings of the Sant'Agata Chapel in Pisa for the preparation of a valorisation and restoration project. Role: Scientific coordinator

-2017 DUS.AD015.092 Diagnostic Campaign on the Slabs of Church San Giovanni Battista Di Michelucci. Role: scientific coordinator

-2013-2016 FIRB MIUR 2012 project "Marmora Phrygiae, interdisciplinary methodologies for knowledge and preservation. Archaeology of architecture, information technologies and chemical-physical sciences for the historical reconstruction of building sites and the supplying of stones in a Roman and Byzantine city of Asia Minor, Hierapolis of Phrygia". Role: Coordinator of research unit of CNR ICVBC

-2012-2015 Ecocement project, founded by European Commission FP 7 "Novel biomimetic technology for enzyme-based microbial carbonate precipitation through the revalorization of industrial waste as raw materials, in order to produce eco-efficient environmentally friendly cement". Role: Participant

2008-2009 Researcher with temporary position at University of Florence in the European Project "MARE NOSTRUM" - A Heritage Trail along the Phoenician maritime routes and historic port-cities of the Mediterranean Sea (Euromed Heritage IV project)

2005-2008 Post-doc research grant at the University of Florence in the National PRIN project "Lapideous resources to antiquity today in the Mediterranean area: cultural identities and technologies. Integrated experiments for the knowledge, conservation and restoration"

2003-2005 Post-doc research grant at CNR Institute for Conservation and Valorisation of Cultural Heritage in the European project " Development of integrate methodologies for the evaluation of durability of monumental stones" (Contract CEE n° G6RD-CT2000-00266; McDUR Project)

EDUCATION AND TRAINING

25 June 1999 Master Degree in Geological Sciences

University of Pisa

Title of the dissertation: A new non-destructive methodology for the characterization of white marbles: set-up and comparison with the classical methodologies

1 May 2000- 30 April 2003: PhD in Science for Conservation of Cultural Heritage

Florence University

Title of the dissertation: The white marbles: relationship among mineralogical, petrographic, physical characteristics and decay phenomena

MAIN EDUCATION AND
TEACHING ACTIVITIES

Member of the Scientific Board of the National PhD in Heritage Science – Sapienza Università di Roma (2022-present)

Organisation of the course “Methods and Technologies for Material Dating” for the National PhD in Heritage Science – Sapienza Università di Roma (2022).

Organisation of the course “Raw materials and provenance of archaeological materials” for the National PhD in Heritage Science – Sapienza Università di Roma (2024).

Lecture for National PhD in Heritage Science – Sapienza Università di Roma (Curriculum 3 and Curriculum 4).

Lecturer for the PhD course in Archaeological, Historical, Architectural and Mediterranean Landscape Heritage (of National Interest), Università di Bari.

Lecturer for Diplomazia 1 and Diplomazia 2 European CNR projects.

Lecturer at the Telematic University UNINETTUNO for the course in Chemistry of the Environment and Cultural Heritage (contract no. 284, signed on 30/06/2016).

Lecturer in Gemmology University of Florence (yy 2005-2006).

Invited Speaker at University of Oxford, University of Tubingen, University of Evora, University of Sarajevo.

Others Member of Board of AIAr association

Scientific supervisor of CNR grants.

Supervisor of 5 PhD theses (Department of Chemistry, Università di Firenze; National PhD in Heritage Science – Sapienza Università di Roma Archaeological, Historical, Architectural and Mediterranean Landscape Heritage, Università di Bari) and 25 master degrees (Università di Firenze)

Member of examination board for PhD thesis of Università di Firenze, Università di Pisa, Politecnico di Milano, Università di Padova, Università di Barcellona

Peer reviewer for international journals: Journal of Cultural Heritage, International Journal of Architectural Heritage, Archaeometry, Journal of Archaeological and Anthropological Science, Heritage, Minerals.

Guest editor of Heritage journal

Member of the SIMP, GABeC and AIAr associations.

OTHER INFORMATION

<https://orcid.org/0000-0002-4909-5624>

Scopus ID 6504539693

Web of Science ResearcherIDDDWG-7433-2022

<https://www.researchgate.net/profile/Emma-Cantisani-2>

PAPERS (peer review, last 5 years)

- Calandra S., Cantisani E., Salvadori B. (2026): Decoding ancient mortars: complementary strengths of SR- μ XRPD and FPA-FTIR in high-resolution binder analysis. *Talanta*, **Volume 299**, 1 March 2026, 129076
- Amicone, S., Orsingher, A., Cantisani, E. et al (2025): Innovation through recycling in Iron Age plaster technology at Tell el-Burak, Lebanon. *Scientific Reports*, **15**, 24284.
- Franceschini M., Ismaelli T., Vettori S...., Cantisani E. (2025) Investigating Technology and Raw Materials Source of the Archaic and Classical Architectural Terracottas From the Athenaion in Castro (Apulia, Italy). *Archaeometry*, December 2025
- Caroti G., Ranquet O., Pizzimenti S., Bernazzani L., Cantisani E., Punis R., Zoleo A., Dietemann P., Willenbacher N., Duce C., Bonaduce I. (2025): On the preparation of model ultramarine blue oil paint layers: factors affecting the wet paint flow and curing, *Journal of Cultural Heritage*, **Volume 76**, 239-250.
- Vettori S., Giannetti F., Braschi E., Avanzinelli R., Virili C., Jaia A., Zanini A., Cantisani E. (2025): Bronze Age vitreous materials from Central Italy: A first insight through an interdisciplinary and multi analytical approach, *Journal of Archaeological Science: Reports*, **Volume 67**, 2025, 105396
- Rasmussen, K.L., Bertelsen, T., Cantisani, E., Franceschini M.M.N. et al. (2025). Testing a hypothesis of technology transfer in the 1100s between Italy and Denmark. *npj Heritage Science* **13**, 58
- Scardozi, G.; Cantisani, E.; Di Benedetto N. (2025): Stone Procurement Strategies in Ugento (Lecce) During the Messapic Age. *Heritage*, **8**, 496.
- Mascaro M.E., Cantisani E., Ricci M., Pallecchi P., Vilucchi S., Dalconi M. C., Maritan L. (2025): The production of terra sigillata in Arezzo, Central Italy: an archaeometric investigation. *Archaeometry*, **67** (3), pp. 604-624.
- Calandra S., Salvatici T., Pecchioni E., Centauro I., Cantisani E., Garzonio C.A. (2025): Comparative Analysis of Mortars of the Arno Riverbanks in Florence. In: Furferi, R., Seymour, K., Pelagotti, A. (eds) *The Future of Heritage Science and Technologies*. Florence Heri-Tech 2024. Springer Proceedings in Materials, vol 70. Springer, Cham.
- Cera G., Cantisani E. (2025): Shells in the furnace. The contribution of archaeological and archaeometric investigations to the understanding of a peculiar find in the Messapian site of Li Schiavoni (Nardò, Lecce). *Orizzonti*, **XXVI**, pp. 119-126.

- Calandra S., Cantisani, E., Conti, C. et al. (2024): A new multi-analytical procedure for radiocarbon dating of historical mortars. *Scientific Reports*, 14, 19979
- Franceschini MMN; Casa G; Calandra S, Ismaelli T; Grifa C; Mercurio M; Amoretti V; Zuchtriegel G; Cantisani E. (2024): Raw materials and building technologies in the public buildings of Pompeii after the earthquake of 62/63 CE: A diachronic analysis of mortars. *Case Studies in Construction Materials*. 21, e03943.
- Franceschini MMN; Calandra S; Vettori S; Ismaelli T; Scardozi G; Caggia MP; Cantisani, E. (2024): Mortars in the Archaeological Site of Hierapolis of Phrygia (Denizli, Turkey) from Imperial to Byzantine Age. *Minerals*, 14(11), 1143
- Villani E; Suzuki A; Ricci M; Salvadori B; Vettori S; Cantisani E. (2024): Red stains on heritage marbles: application of micro-scale analyses to assess the presence and distribution of lead compounds. *Analyst*, 149, pp. 4872-4880
- Cantisani, E., Salvioli, N., Salvadori, B. (2024): Polychrome Bronze Sculpture: A Multi-Analytical Approach to Unveil the Renaissance Gilded Eagles in the Abbey of San Miniato al Monte, Florence, *Heritage*, 7(2), pp. 983–996.
- Vettori S., Cantisani E., T.Ismaelli, G. Scardozi, a. Buccianti, F. Di Benedetto (2024): An EPR study of the marbles from quarries of the Denizli region (Turkey): A contribution to the provenance assessment of materials with close relationships, *Microchemical Journal*, 202(1):110802
- Andreotti, A., Colombini, M.P., Cantisani, E., ...De Cruz, A., Nakahara (2024): Gradual cleaning of a seventeenth-century polychrome wood sculpture by Er:YAG laser. *Lasers in the Conservation of Artworks XIII - Proceedings of the International Conference on Lasers in the Conservation of Artworks XII, LACONA 2022*, pp. 123–131
- Andreotti, A., Bonaduce, I., Cantisani, E., ...Salvadori, B., Vettori, S (2023): Ancient restoration practices in the Monumental Nymphaeum at Tripolis ad Maeandrum (Turkey): multi-analytical approach on Roman and Byzantine bonding mortars, *Journal of Cultural Heritage*, 63, pp. 71–80
- Boese B., Amicone S., Cantisani E., Schön F., Berthold C. (2023): Mortars in context: An integrated study of mortars and plasters from the so-called Ginnasio in Solunto (Sicily, Italy), *Archaeometry*, 65(4), pp. 702–720.
- Calandra, S., Conti, C., Centauro, I., Cantisani, E. (2023) Non-destructive distinction between geogenic and anthropogenic calcite by Raman spectroscopy combined with machine learning workflow, *Analyst*, 148(12), pp. 2861–2870
- Castagna R., Riminesi C., Pianesi M.S., ...Castellini, P., Lucchetta, D.E. (2023): Development of a Quartz-Based Photo-Mobile Polymer Film for Controlled Motion Triggered by Light or Heat, *Materials*, 16(8), 3046
- Calandra, S., Barone, S., Cantisani, E., ...Vettori, S., Fedi, M. (2023): Radiocarbon dating of straw fragments in the plasters of St. Philip Church in archaeological site Hierapolis of Phrygia (Denizli, Turkey). *Radiocarbon*, 65 (2), pp. 323 - 334
- Longo S., Castellini M., De Luca F., ...Caselli G., Cantisani E. (2023): The Terrace of Saturn in Palazzo Vecchio, Florence (Italy): Material Characterisation and Monitoring for Preventive Conservation, *Lecture Notes in Mechanical Engineering*, pp. 376–391
- Bracci S., Cantisani, E., Conti, C., ...Tomassini, P., Marano, M. (2022): Enriching the knowledge of Ostia Antica painted fragments: A multi-methodological approach. *Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy*, 265, 120260
- Calandra S., Cantisani E., Salvadori B., Barone S., Liccioli L., Fedi M., and Garzonio C.A. (2022): Evaluation of ATR-FTIR spectroscopy for distinguishing anthropogenic and geogenic calcite. *J. Phys.: Conf. Ser.* 2204 012048
- Cantisani E., Fratini F., Pecchioni E. (2022): Optical and electronic microscope for minero-petrographic and microchemical studies of lime binders of ancient mortars. *Minerals*, 12(1), 41

- Magrini D., Cantisani E., Vettori S., Rasmussen K.L. (2022): Insights into Della Robbia's Terracotta Monument to Cardinal Federighi: Raw Materials and Technologies. *Applied Sciences* (Switzerland), 12(9), 4304
- Calandra S., Cantisani E., Vettori S., ...Agostini B., Garzonio C.A. (2022): The San Giovanni Baptistery in Florence (Italy): Assessment of the State of Conservation of Surfaces and Characterization of Stone Materials. *Applied Sciences* (Switzerland), 2022, 12(8), 4050
- Fejfer M., Łucejko J.J., Miazga B., Cantisani E., Zborowska M. (2022): Gold Mine Wooden Artefacts: Multianalytical Investigations for the Selection of Appropriate Consolidation Treatments, *Molecules*, 2022, 27(16), 5228
- Fratini, F., Rescic, S., Arrighetti, A., Cantisani, E., Pecchioni, E. (2022): Pietra Alberese: from Traditional Building Material of the Tuscan Countryside to the Present Use (Tuscany, Italy). *Geoheritage*, 14(2), 51
- Cantisani E., Calandra, Barone S. , Caciagli S., Fedi M., Garzonio C.A., Lucia L., Salvadori B., Salvatici T., Vettori S. (2021): The mortars of Giotto's Bell Tower (Florence, Italy): raw materials and technologies. *Construction and Building materials*, Volume 267, 120801
- Cantisani E., Fratini F., Vettori S., Pecchioni E., Chelazzi L. & Arrighetti A. (2021): Mineralogical and petrographic study of building materials from the Argentario coastal towers (Tuscany, Italy): anthropic evidence of the ancient landscape. *Ital. J. Geosci.*, Vol. 140, No. 1, pp. 155-166,
- Fratini F., Cantisani E., Pecchioni E., Pandeli E., Vettori S. (2020): Pietra Alberese: Building Material and Stone for Lime in the Florentine Territory (Tuscany, Italy). *Heritage*, 3(4), 1520-1538;
- Pecchioni E., Fratini F., Pandeli E., Cantisani E. and Vettori S. (2020): Pietraforte, the Florentine building material from the Middle Ages to contemporary architecture. *Episodes*. International Union of Geological Sciences.
- Bartolozzi G., Bracci S., Cantisani E., Iannaccone R., Magrini D., Picollo M. (2020): Non-invasive techniques applied to the alchemical codex of the State Archive of Florence. *Spectrochimica acta. Part A, Molecular and biomolecular spectroscopy*. Volume 240, 118562
- Pecchioni E., Fratini F., Cantisani E. (2020): Atlante delle malte antiche in sezione sottile al microscopio ottico, seconda edizione (Italiano ed inglese), Nardini, 2020.