



Postdoctoral Fellowship in Analytical Chemistry applied to Archaeology

Molecular and Chemometric Analyses of Organic Adhesives used in Maya Archaeological Mirrors

We are hiring a full-time postdoctoral researcher (duration: from early 2025 to December 31st, 2026) in archaeometry or analytical chemistry at IMBE lab (CNRS, IRD, Aix-Marseille University, Avignon University) of Avignon University to develop analytical tools dedicated to the chemical characterization of ancient organic residues.

The Mayacosta project

This postdoctoral fellowship is part of the MAYACOSTA research project (Call: ANR-22-CE27-0023), which aims to determine the nature of the relationships between the Maya region and northern Costa Rica between 500 BCE and 600 CE. The project focuses on the exchange of some of the most sacred objects of Maya royalty, such as iron ore mirrors. These artifacts are found in significant quantities in northern Costa Rica, over 1,000 km from their potential production areas, even though no similar objects have been discovered in the regions between. Iron ore mirrors are directly associated with Maya religious material from the Late Preclassic and throughout the Classic Period (250–950 CE). These mirrors typically consisted of three characteristic components: a backing, often made of stone; an adhesive layer composed of clay mixed with organic material; and iron ore tesserae, which could be pyrite or hematite, affixed to the adhesive. These adhesives have never been studied in detail and could provide insights into the technical traditions of specific production workshops. The botanical species used as sources for the organic materials vary according to geographic and ecological context, resulting in compositional differences based on production site. Characterizing these adhesives could therefore help trace the origins of mirrors found in Costa Rica.

The postdoctoral contract

This postdoctoral researcher will benefit from a contract with a flexible start (preferably from February, 2025) and ending on December 31st, 2026. Funding also includes a research allowance of €10,000 to cover operating costs and support the candidate's research activities. The successful candidates will be employed by Avignon University with a gross monthly salary based on experience and starting at around €3,000.

The candidate's profile

- PhD in analytical chemistry, physical chemistry, environmental chemistry, archaeometry, or related sciences; and at least 2 years of postdoctoral experience would be appreciated.
- Advanced expertise in chromatographic (GC-MS, Py-GC-MS or LC-MS/MS) and spectroscopic (FT-IR, MS) techniques applied to natural organic materials.
- Experience in one or several of the following fields: (i) trace analysis of organic compounds in heterogeneous matrices, (ii) analysis of organic archaeological materials, (iii) application of chemometric analyses for processing chromatographic and spectrometric signals and knowledge of programming (R), and/or (v) LC-MS or GC-MS based metabolomics.
- Excellent analytical and problem-solving skills, with a keen interest in archaeology.

Candidates should be well organized, experienced in working in a multidisciplinary team, fluent in English and should have excellent writing skills.



The candidate's role

The recruited candidate will take part of WP2 of the international Mayacosta project dealing with the physico-chemical characterization of artefacts. The main responsibilities will be: (i) to develop an analytical strategy to characterize the adhesives used various analytical techniques (FTIR, GC-MS, Py-GC-MS, LC-MS), (ii) to identify the adhesive manufacturing techniques used in the Maya region and their geographical specificities, (iii) to compare the compositions of adhesives from the Maya region with those from pre-Columbian Costa Rica using chemometric and/or metabolomics approaches. The successful candidate will have access to a wide range of analytical equipment, including that of IMBE lab and Avignon University's metabolomics platform (GC-ToF-MS, Py-GC-MS, UPLC -HRMS, UPLC-TQ-MS, NMR...).

The hosting institution

The successful applicant will be housed in the IMBE lab, Campus Jean-Henri Fabre, Avignon University, Avignon, France.

Avignon University: In 1303, Pope Boniface VIII founded a university in Avignon (France), only a few months after the one in Rome. Soon, other popes came to live in the city, and students flocked to learn law. Suppressed like everywhere else during the Revolution, higher education was reborn in Avignon in 1964, before becoming a real university in 1984. Today, its two campuses, Hannah Arendt and Jean-Henri Fabre are proof that the Agrosiences, Environment and Health (AgES) and Culture, Heritage and Digital Societies (CPSN) institutes are the cornerstones of a credible future for Provence, for its young people and for living together.

IMBE lab: IMBE is a Joint Research Unit bringing together two universities (Aix Marseille Univ. and Avignon Univ.) and two research institutes (CNRS and IRD). This Unit carries out integrative research, developing global and interdisciplinary approaches to the study of biodiversity and ecology. This research is taking place in a global context of threats to biodiversity and global changes ecosystems as a result of human activity.

The IMBE has more than 260 members working in a variety of complementary scientific and technical fields: ecology, biology, chemistry, medical or pharmaceutical sciences, social sciences. IMBE is interested in marine and continental systems and their interfaces in a variety of biogeographical contexts, and at different levels of life organisation (from the molecule to the ecosystem). The organisation and functioning of biodiversity and ecosystems their historical and evolutionary dynamics, their vulnerability, their conservation and their restoration as well as the effects of their degradation on human health are at the heart of our interdisciplinary research and our various training initiatives.

Avignon and the surrounding area: Capital of the Vaucluse and Côtes-du-Rhône wines, [Avignon](#) is a city where history is omnipresent, as well as art, nature, gastronomy... and theater! Between its UNESCO-listed sites, its activities and its art of living, Avignon offers a glimpse of the best of [Provence](#).

How to apply?

For more information, please contact **Dr Matthieu Ménager**, mail: matthieu.menager@cemca.org.mx and **Pr Gérald Culioli**, mail: gerald.culioli@univ-avignon.fr.

Interested candidates should submit by mail (at the two addresses mentioned above) a single PDF file containing a cover letter outlining their research interests and relevant experience, a CV including a list of publications and communications, and contact information for at least two references.

Review of applications will begin immediately and continue until this postdoctoral position is filled.