Analytical studies of works of art and cultural heritage objects are keen to contribute to: 1) the knowledge of the artists' materials and techniques; 2) the understanding of their deterioration mechanisms and the evaluation of possible conservation methods; and 3) as tools to help in authentication and provenance studies.

The State of Minas Gerais, in Brazil, presents about 70% of the baroque and rococo Brazilian State listed and protected heritage. Their materials and techniques are well known, but analytical details such as the gilding alloy composition or the evaluation of trace elements in the different gilding layers are relevant to provenance and/or authorship studies.

Our team is involved with authentication and provenance studies of two particular wooden polychrome pieces, supposed to have been produced as part of one whole altarpiece. The objects are: 1) a 18th century wooden polychrome sculpture described as "Santana Mestra", found in the State of São Paulo and brought to Minas Gerais for legal identification; and 2) a wooden gilded altarpiece, nowadays located at the Chapel of the Hospital of São João de Deus, in the city of Santa Luzia, Minas Gerais, Brazil. Small gilding fragments were collected from both the sculpture and the altarpiece, through the use of a miniscalpel and a stereobinocular loupe. The fragments were further embedded in acrylic resin and polished for conventional optical microscopy, including digital photography of the polished sample surface (Zeiss Axiocam), followed by scanning electron microscopy. Equipments include a optical microscope (Olympus SZ11) from the Conservation Science Laboratory of School of Fine Arts of UFMG; and a scanning electron microscope Quanta 3D-dual FIB from FEI, equipped with a Bruker X-ray dispersive spectrometer (EDS), from the Center of Microscopy of UFMG. Both punctual and mapping energy dispersive x-ray analysis (EDS) of samples from the sculpture and the altar were performed in an area which corresponds to the sequence of layers ground - armenian bole - gilding, with a focus on the gilding composition.

On all of the metallic leaf samples we find silver as a trace element, together with the main gold component. Sometimes copper was also detected. The other elements, such as Al and Si, are characteristic of the bole argilous layer. Our expectation is to be able to compare the Ag concentration in several samples of gilding from different churches in Minas Gerais, in order to be able to prove that both gildings, from the Saint and from the Altarpiece, have been produced with the same gold leaf - or not. The set of results will be of invaluable help in determining the effective provenance of religious gilded polychrome sculpture in Minas Gerais, Brazil.
Fig. 1: Energy Dispersive X-ray point spectra of sample 2616 taken at the same region where the mapping shown below was performed.

Fig. 2: Gold Energy Dispersive X-ray mapping of a small region of sample 2616 - magnification 8.000 times

Fig. 3: Silver energy Dispersive X-ray mapping of a small region of sample 2616 - magnification 8.000 times