

# The PHYsICAL project: Research protocol applied on a Japanese buddha statue

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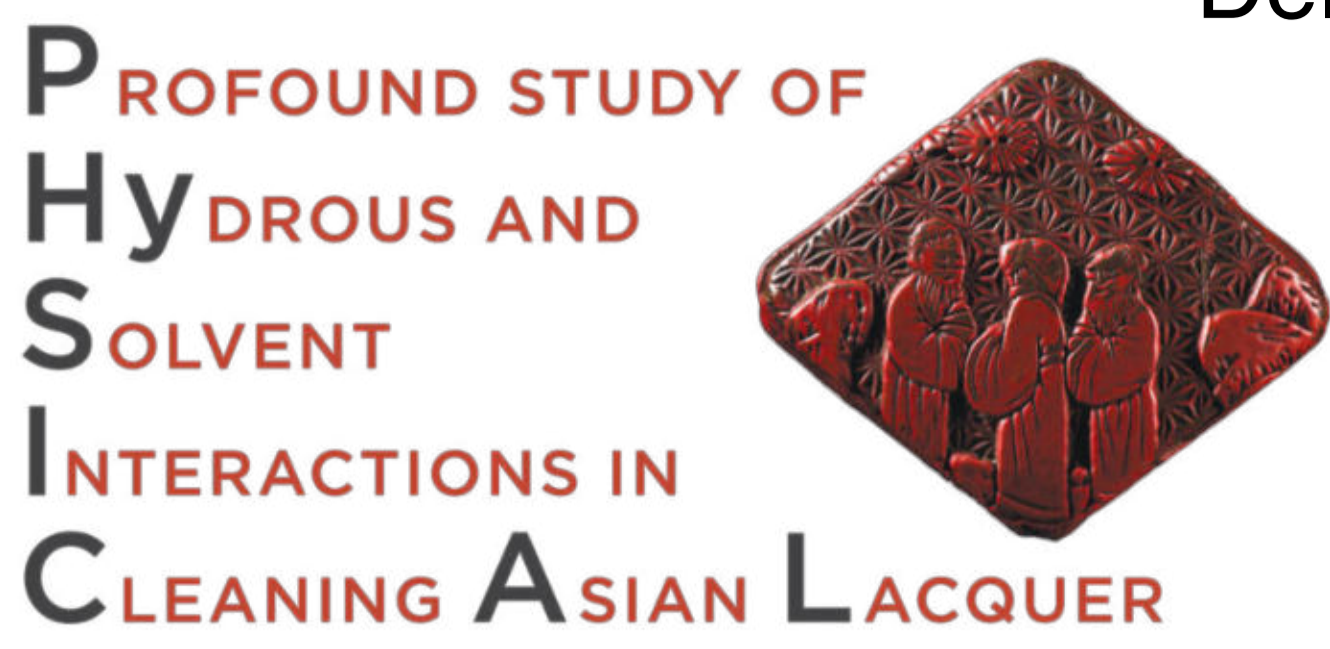
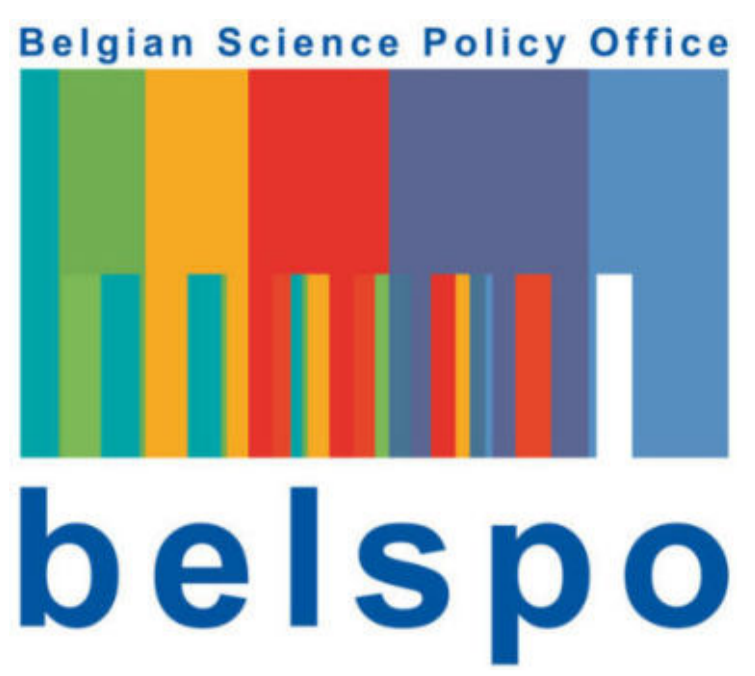
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## Let's get PHYsICAL

The research focuses on the scientific study of the interactions of solvents with lacquer surfaces to formulate "best practices" for cleaning Asian lacquers.

The emphasis is put upon possible changes in **chemical as well as physical aspects** of the lacquer through **solvent and aqueous cleaning**. Special attention is imposed to the lacquer collection of the Royal Museums of Art and History (RMAH), evaluating the current condition of the lacquerware and proposing strategies for safe cleaning and hence, concede their long-term preservation.

To elucidate the **solvent/lacquer interactions** chemical analyses are carried out at the Royal Institute for Cultural Heritage (KIK/IRPA) and Ghent University (UGhent), applying complementary chromatographic techniques. **Evaluation of the visible aspects** e.g. gloss, colour and **physico-chemical** surface pH investigations will be exploited by the RMAH staff.

## Optical light microscopy

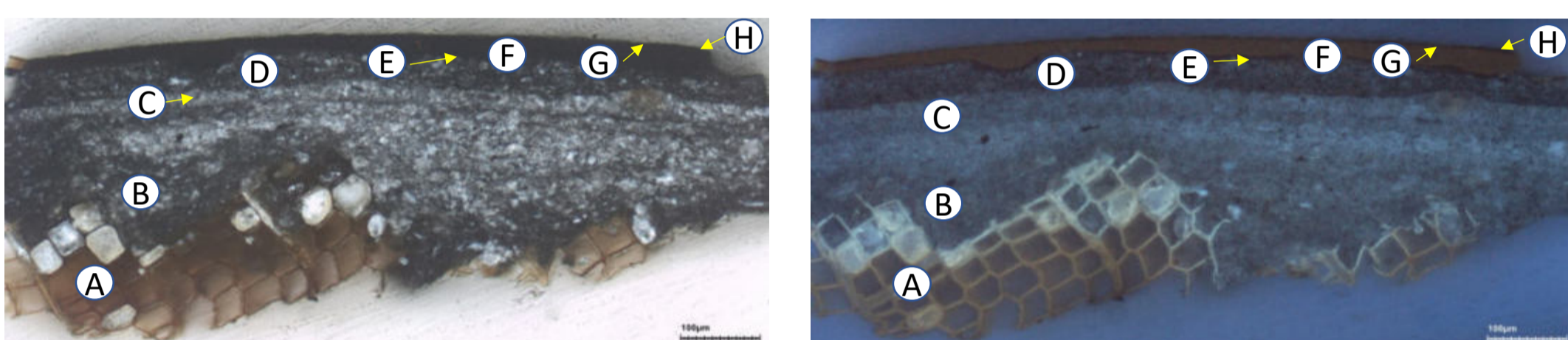


Figure 2,3: Cross-section under visible and ultraviolet (UV) light illumination. 200x magnification.

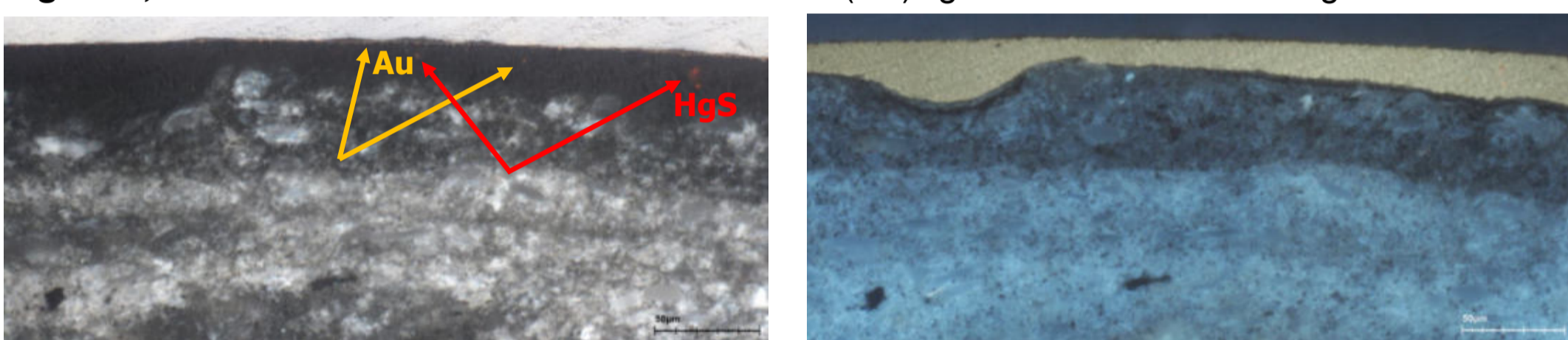


Figure 3,4: Cross-section under visible and ultraviolet (UV) light illumination. 500x magnification.

## SEM-EDX analysis

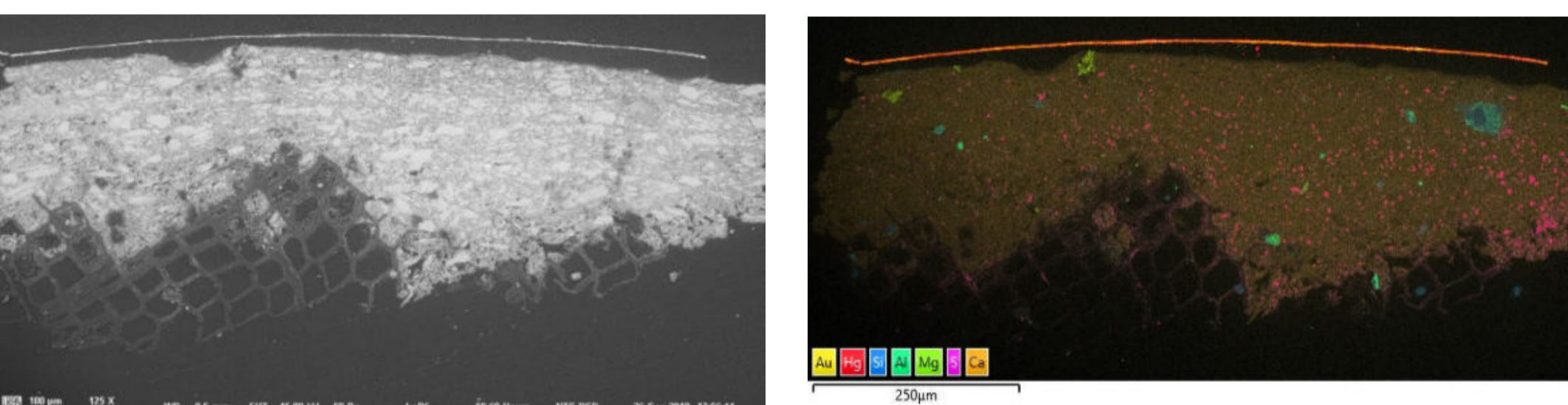


Figure 5: SEM image of the cross-section.

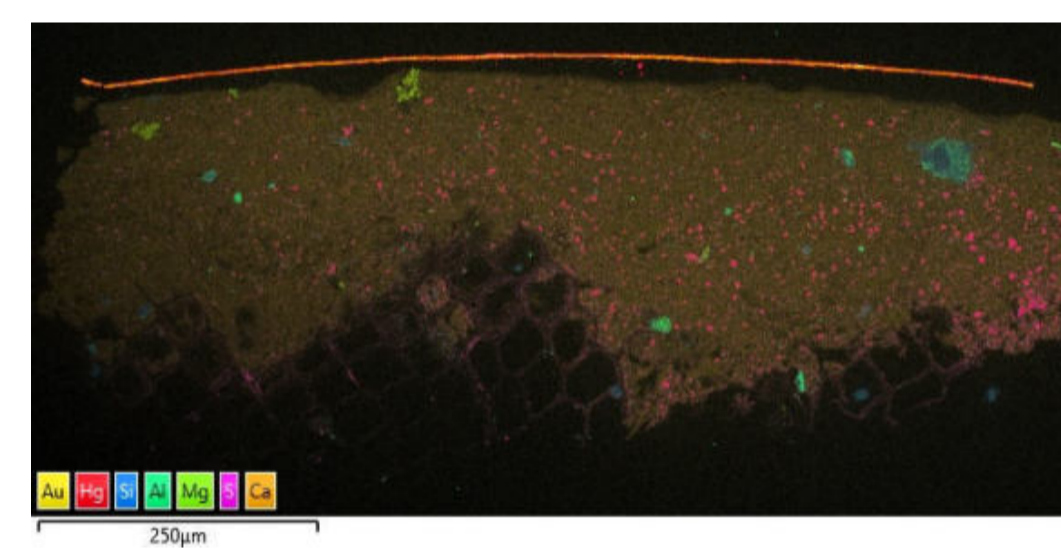


Figure 6: Layered Energy Dispersive X-Ray Spectroscopy (EDS) mapping.

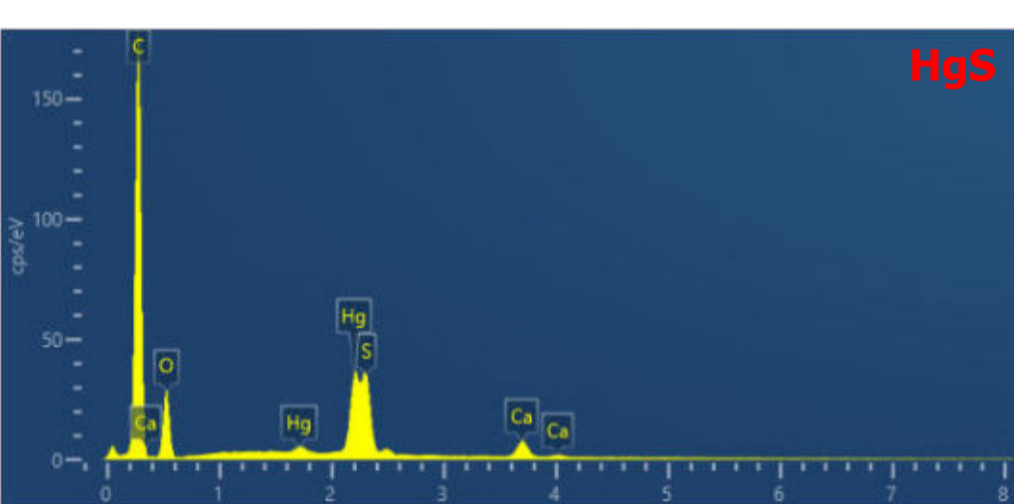


Figure 7: EDS-spectrum of Vermillion (HgS) in second lacquer layer F.

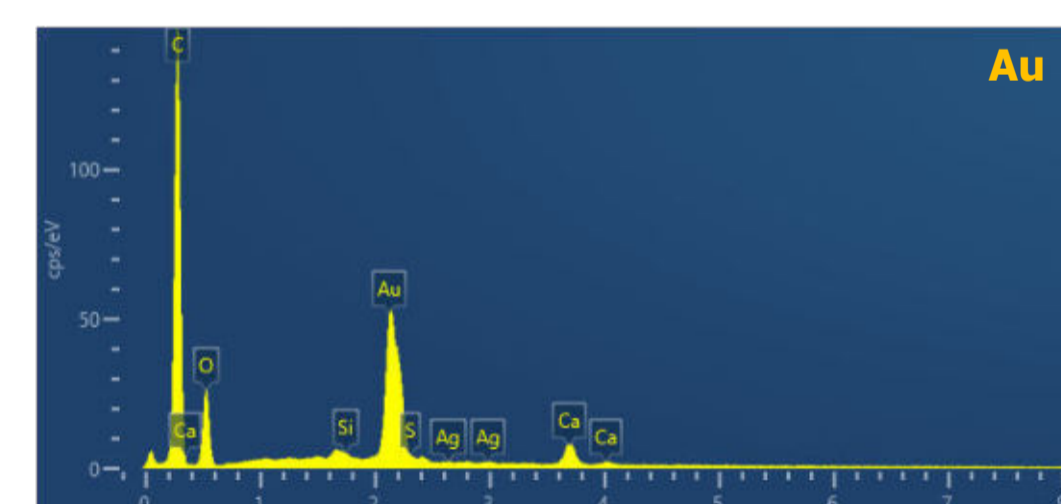
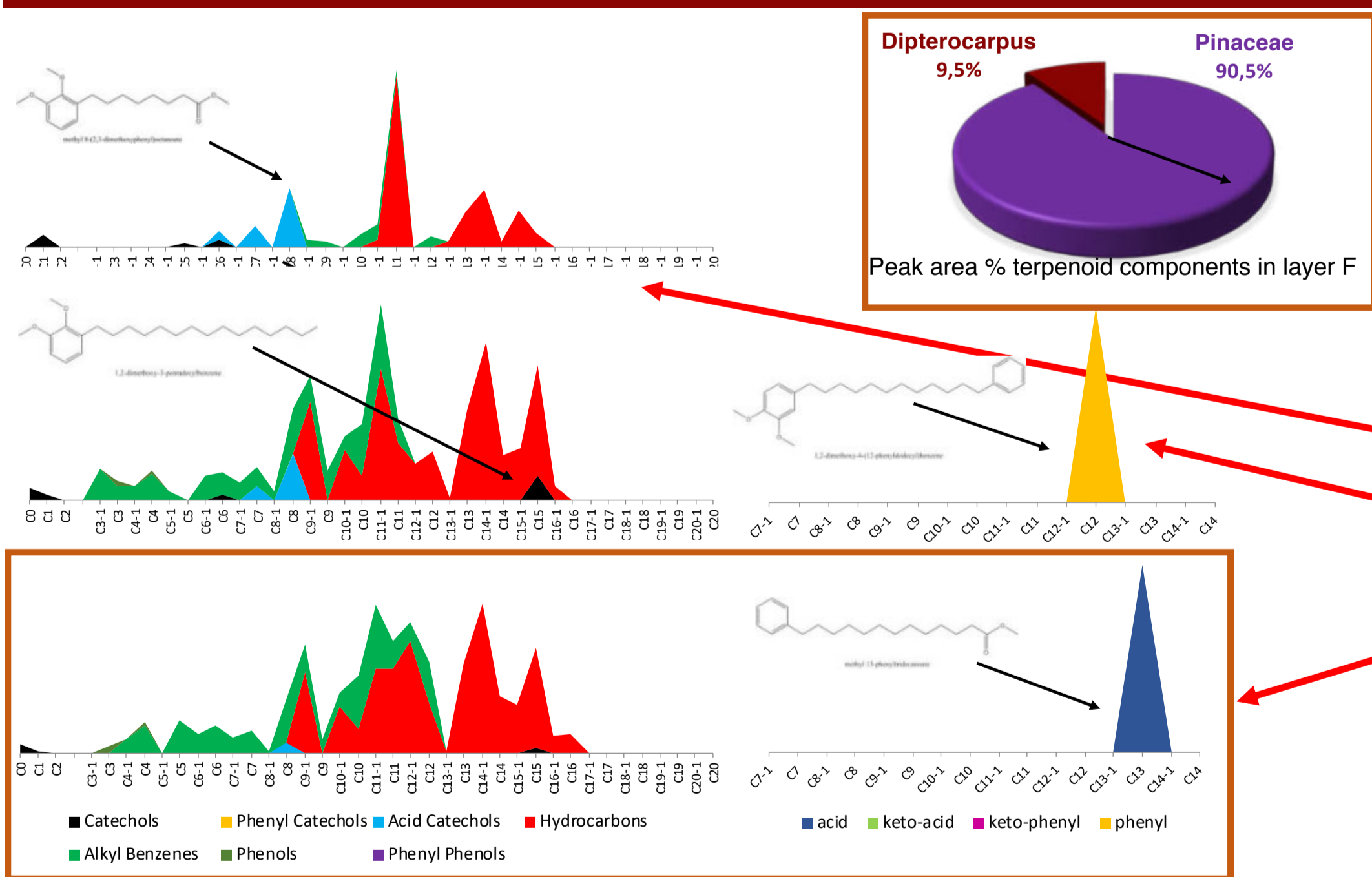


Figure 8: EDS-spectrum of gold (Au) in layer G.

## Py-GC/MS layer-by-layer analysis



Graph I, II, III: Gestalt graphs representing peak areas of Asian lacquer (Anacard) marker molecules.

Graph IV, V: Gestalt graphs representing peak areas of thitsi (Anacard) marker molecules.

## Amida descends for analysis

The Triade represents *Amida*, descending from the sky on the clouds, making the feast of charity and that of teaching, accompanied by Seishi, the hands in prayer, and Kannon holding the seat of the lotus for the soul of the dead. The archives provided us some information, like a letter dated 1st July 1957, addressed to the Chief Curator mentioning a legacy from a friend of the Museum, Mr Peeters. He describes the statue as follows: "A wooden statue representing the descent of Amida according to the vow: "If I can not appear before the one who would manifest the belief in my heart, accomplished all the virtues, emitted at the time of his death the desire to be reborn in my country, if I can not do that, I do not accept the enlightenment of Buddha.""

The work is of good quality and interesting from an iconographic point of view: according to Peeters "it perfectly illustrates a very popular form of late Buddhism".

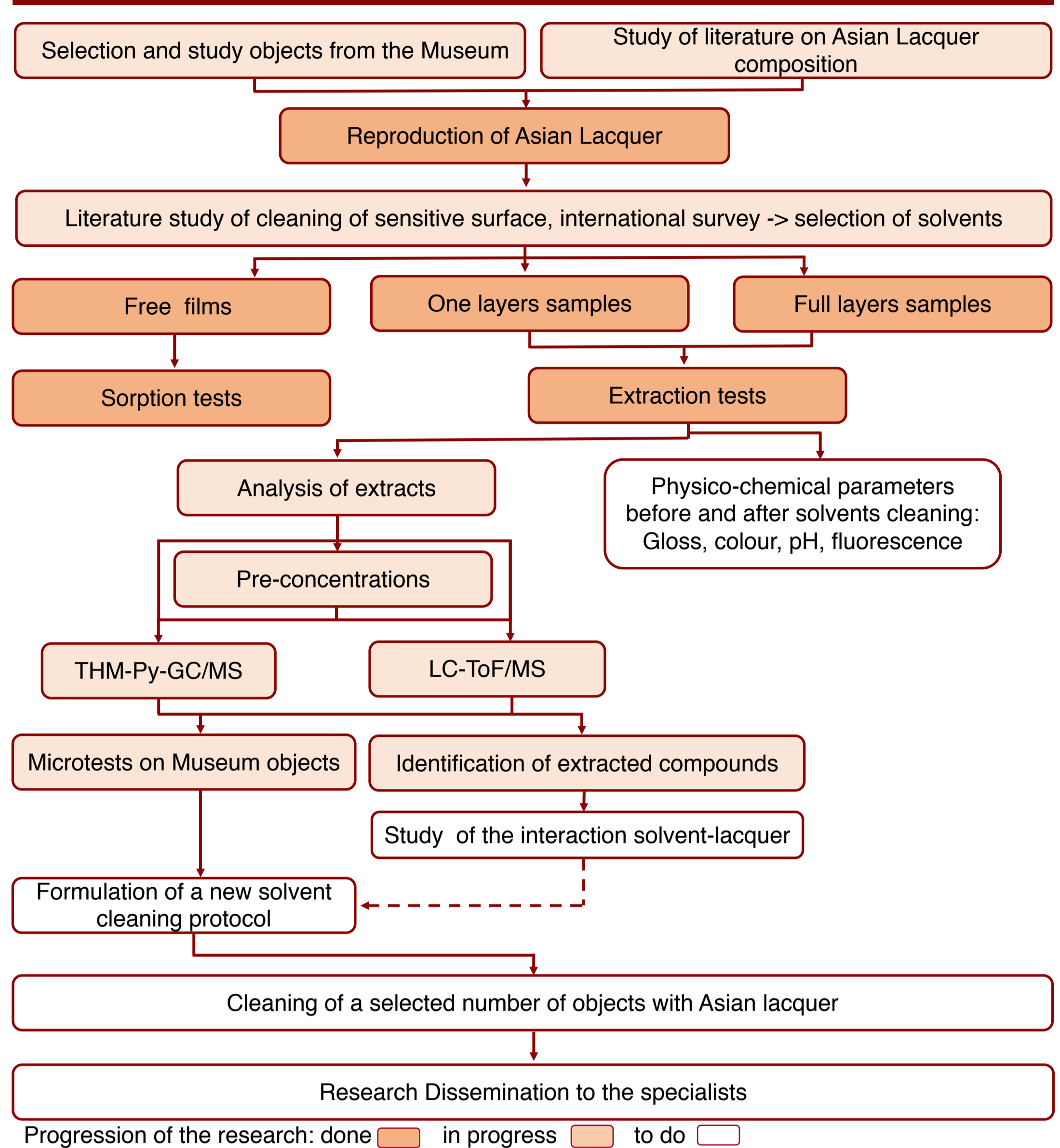


Figure 11: Japanese Triade, 18th Century, Japan, EO.3319. Royal Museum of Art and History.

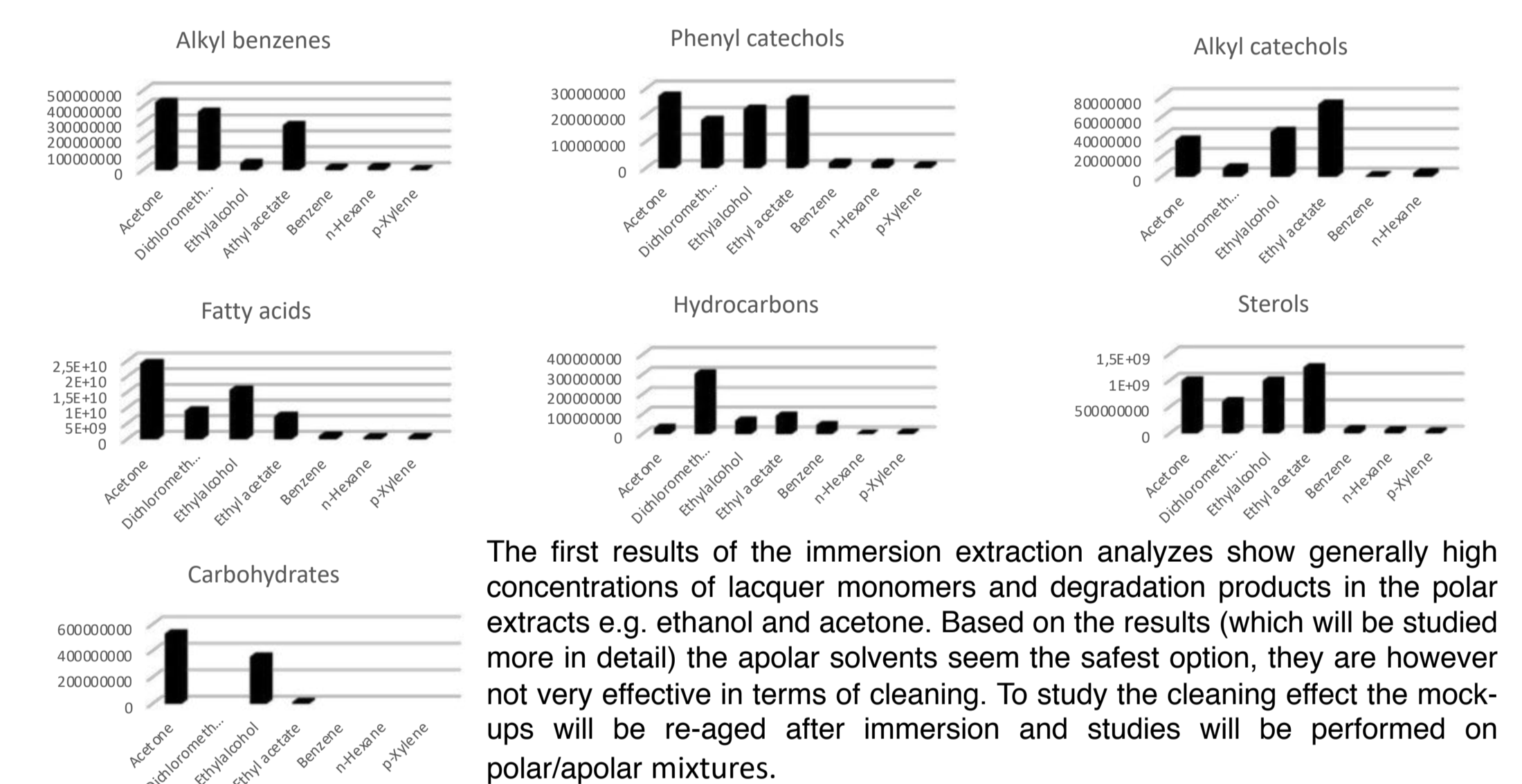
Layer Name	Description	Results of the analytical study
H	Third lacquer layer	Very thin transparent layer
G	Gold layer	Gold brownish transparent layer
F	Second lacquer layer	Very thin brownish transparent layer
E	First lacquer layer	Layer of thick black lacquer
D	Top ground layer	grey ground layer, quite compact although granular
C	Mid ground layer	Grey ground layer, grainy, lighter than layer B
B	Lower ground layer	Dark grey ground layer, grainy and compact
A	Wood	

Table I: Layer descriptions of the statue sample

## How it's done

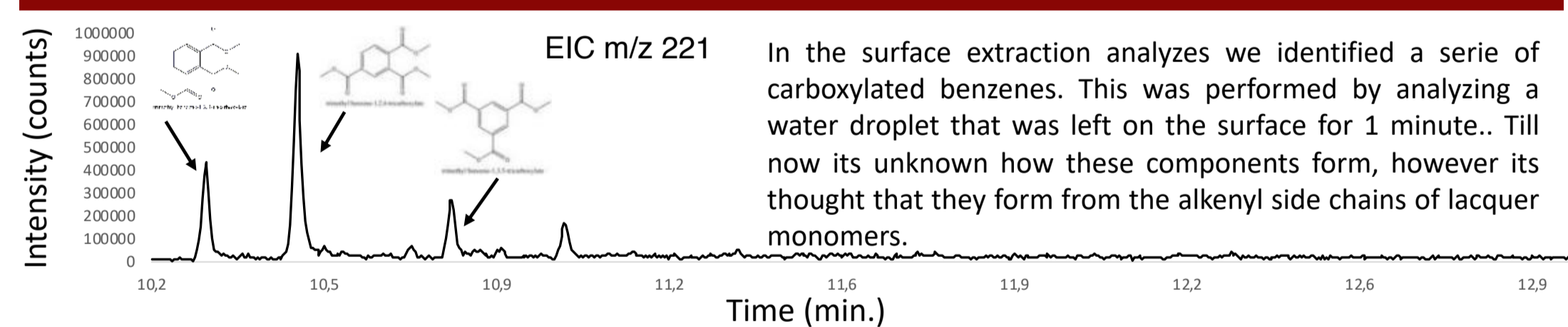


## Splitless (BSTFA) GC/MS on single solvent immersion extractions

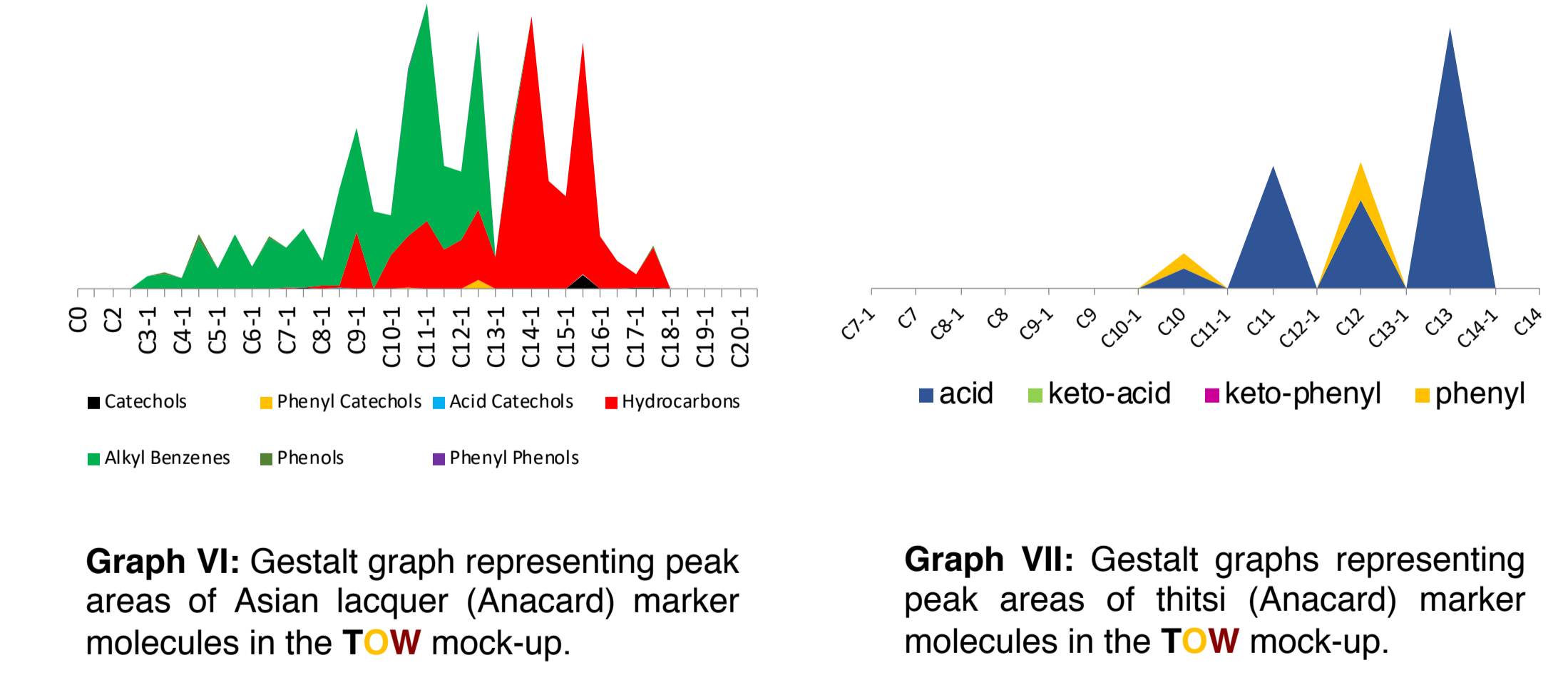


The first results of the immersion extraction analyzes show generally high concentrations of lacquer monomers and degradation products in the polar extracts e.g. ethanol and acetone. Based on the results (which will be studied more in detail) the apolar solvents seem the safest option, they are however not very effective in terms of cleaning. To study the cleaning effect the mock-ups will be re-aged after immersion and studies will be performed on polar/apolar mixtures.

## Py-GC/MS on surface extractables



## Mock-up production and ageing



Graph VI: Gestalt graph representing peak areas of Asian lacquer (Anacard) marker molecules in the TOW mock-up.

Graph VII: Gestalt graphs representing peak areas of thitsi (Anacard) marker molecules in the TOW mock-up.

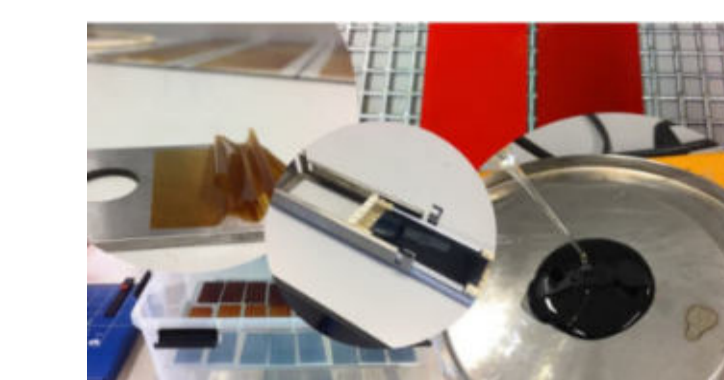
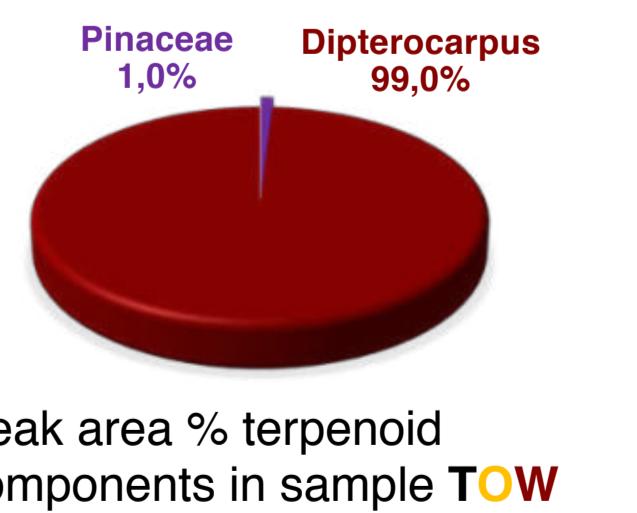


Figure 9: Production of the mock-up samples and ageing.

Ingredient	Amount (%)
Thitsi	90
Tung Oil	5
Wood oil	5

Graph VIII: Constituents sample TOW



Peak area % terpenoid components in sample TOW

## We need you!

Experiences within the conservation work-field are needed to focus the PHYsICAL research and take lacquer cleaning to the next level. For this we need your expertise! Would you like to help us and make the research applicable within the lacquer conservation community, then please take part in our survey. This first phase focusses on the materials and formulations used in the aqueous and solvent cleaning of Asian lacquer. The information gained will help to select or discard specific cleaning formulations. Application materials such as gels, tissues etc. is an important part in a cleaning treatment, but will not be taken into account for the moment, as it is subject of the follow-up survey.

## Survey QR Code



## Acknowledgements

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