

Recent Advances in Characterizing Asian Lacquer

Center for Conservation and Preservation, Yale University, July 15 – 19, 2013

SESSION OUTLINE

SESSION TITLE: The characterisation of Asian lacquer coatings with optical microscopy and histochemical staining methods

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ABSTRACT

In recent years, histochemical staining methods for characterizing materials in the field of conservation appear to have become less popular with the increasing availability and sophistication of analytical equipment that is capable of great detail and precision. However, these simple methods are valuable as a means to produce data quickly and efficiently with the full control of the tester and without the need of great expenditure in terms of time and resources. Furthermore, it has recently been shown that the use of specific stains for cross-section examination of Asian lacquer coatings combined with fluorescent microscopy is capable of yielding reliable and correct results for the identification of certain binding media types (Schellmann 2012).

This session will provide instruction in the use of histochemical staining methods for characterizing the structure and the binding media composition of multilayered Asian lacquer coatings. By examining unstained and stained cross-sections of embedded coating samples using visible and fluorescent light microscopy, layer-specific information for a number of organic materials (particularly binding media) will be obtained if present in significant concentrations. The results of this examination will provide detailed information on layer structure that will benefit the other techniques of precise sampling of discrete layers and pyrolysis-gas chromatography/mass spectrometric analysis (Py-GC/MS) which will be undertaken during the other sessions of this workshop.

OBJECTIVES

By the end of this session, participants should be able to:

- understand the possibilities and limits that simple optical microscopy of cross-sections using VIS and blue light can offer for characterizing multilayered lacquer coatings and for identifying specific binding media types used in their manufacture.
- be familiar with the use of a selection of histochemical staining methods.
- interpret the appearance of unstained and stained multilayered lacquer coating samples using VIS and blue light microscopy.
- judge the reliability of the staining results and the identification of binding media by their fluorescence under blue light.
- compile and present the results in a meaningful manner.

CONTENT OUTLINE

1. Introduction:
 - o cross-section microscopy using VIS and blue light
 - o histochemical staining methods for binder identification – advantages and limits
 - o comparison of efficiency with regards to other analytical methods



SESSION OUTLINE CONT'D.

2. Staining essays: demonstration and practical work
3. Interpretation of results (unstained and stained sample)

Compilation and communication of results

METHODOLOGY

The session will be divided into three parts:

1. The instructor will introduce the method of cross-section staining with histochemical stains in combination with examination under visible and blue light using the optical microscope. Recent research that investigated the efficiency of such staining methods in comparison with other analytical methods used for identifying binding media will be discussed, in order to highlight the scope and limits of this approach. Typical examples of stained and unstained East Asian lacquer layer structures will be presented to introduce the participants to the appearance of the various types of binding media in situ.


2. In the practical part of this session, each team consisting of one conservator and one scientist will work with their own multilayered lacquer coating samples they brought with them to the workshop. Cross-sections, which were prepared before the workshop, will be examined under VIS and blue light using an optical microscope. The cross-sections will then be stained using four histochemical staining solutions in order to identify the presence of three binding media types: protein, starch and oils. Asian lacquer will be identified by its characteristic natural fluorescence under blue light. All the results gathered before and after staining will be documented photographically and in descriptive form and will be fed into a template that allows direct comparison of the data.


3. During the third part of the session, the participants will interpret the compiled results and will learn how to make use of the advantages of the chosen identification methods as well as how to tackle their challenges and limits. The teams will prepare a systematic overview of their results and feed them into a template to be later compared with the Py-GC/MS results gathered in the chemical analysis part of this workshop. At the end of this session, the participants will present the results to their fellow teams, followed by a group discussion that is held together with the instructors.



BIBLIOGRAPHY

 = Essential reading material

 = Available online

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SESSION OUTLINE CONT'D.

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