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Introduction
Enamelling is a technique where vitreous silicate-rich material is fused to the surface of an object by heat through a controlled firing to create a decorative surface. The earliest enamelled metals in Europe are thought to be Mycenaean repoussé and cloisonné dating between 1450-1100BCE, and champlevé examples on Chinese bronzes date back to 1200-1050BCE. Later techniques developed in Europe include traditions such as Basse-taille from the thirteenth century, and painted enamels in the sixteenth century. Conservation of enamelled metals is an interdisciplinary subject drawing on aspects of glass and metals conservation. Enamels are inherently vulnerable to high humidity, fluctuations in temperature, vibration and physical stress. The majority of publications on the conservation of enamelled metals address Limoges painted enamels due to their chemical instability and popularity in the art market leading to numerous emulations, fakes and forgeries. The following
bibliography provides a list of key publications on conservation of enamelled metals. The articles were written by practising conservators and therefore pay particular attention to degradation phenomena, whereas the books give essential background information on materials, techniques and history.

Books
For those who want to know more, or are researching a niche subject, this is a thorough review of publications on enamelled metals. Publications are presented by subject and date with brief synopsis, followed by an author’s index.

The development of enamelling on metals in China is outlined in the introduction, the emphasis of the book is on stylistic progression and a compositional study can be found in the appendix.

A good starting point for clarifying the names of materials and techniques, this dictionary is an essential reference for enamelled metals with detailed historical information across cultures.

A well-rounded book covering painted enamel traditions from around the world. Unusually, the subject is explored into the 20th century and well referenced making it particularly insightful.

Articles
A retrospective account of the impact of conservation treatments dating back to the 1960s on chemically unstable Limoges painted enamels from the fifteenth to sixteenth centuries in one of the world’s largest museum collections. This paper addresses the underlying chemistry of unstable Limoges enamels and resulting deterioration phenomena.

Corrosion products on enamelled metal objects in museum collections are identified in this paper. The interaction of off-gassing storage and case materials were found to instigate types of corrosion which would not have formed otherwise. Additional publications on enamel corrosion by this team have been published under the same title, numbered II-VI.

In this paper the underlying causes of degradation in the collection of 56 Chinese painted enamels
were studied. The results indicate that these enamels do not exhibit signs of chemical instability, and that most damage is associated with use rather than accidental impact.


An investigation of restoration on two Limoges painted enamels where unstable areas were replaced with fired-enamel sections. This study utilises a range of analytical and imaging techniques to differentiate between original components and additions.

**Online Resources**


In this project a group of fifteenth- to sixteenth-century Limoges enamels were monitored acoustically to document physical changes in correlation with temperature changes while on display. The results are relevant to preventative conservation of enamelled metals in general.