



**Third International Congress on
Chemistry for Cultural Heritage**

July 1 – 5, 2014
Academy of Fine Arts
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Book of Abstracts

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FADED SHINE USE AND DEGRADATION OF METAL BRASS POWDER IN TWO 19TH CENTURY PAINTINGS

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During the examination of the painting entitled *The reading priest* (1885) in the context of the ongoing research project into the painting technique of Ferdinand Hodler (1853–1918) at SIK-ISEA, it was observed that in particular locations, the surface had an unusually granular texture, given by the application of metallic powder combined with large translucent green agglomerates. A second example of this phenomenon was identified in a painting entitled *Portrait of a young maid* (1888) by Filippo Franzoni (1857-1911) also a Swiss painter and contemporary of Hodler. In this paper we investigate the composition and origin of this surface application and characterize the alteration processes leading to its current appearance.

The painting *The reading priest* by Hodler represents a three quarter portrait of a priest reading a book which he holds close to the chest. The scene has as main light source, a window behind the left shoulder of the priest, covered by a semi translucent curtain. Surface observation under stereomicroscope showed that a combination of metallic powder and green agglomerates were present in areas where increased luminosity is to be expected, where the light originates and where upon it falls: e.g. the curtain, the table, the priests' earlobe.

In the case of the *Portrait of a young maid* by Franzoni the metal powder was used in a less pictorial way and could only be seen, under closer observation with stereomicroscope, used sparingly in the background paint. It is important to mention that two factors hindered the clear visualization of the distribution

of metal powder in the painting by Franzoni: On the one hand Franzoni himself had extensively reworked his painting (no longer using metal powder but rather conventional pigment mixtures) partially covering the paint layers containing the metal powder. On the other hand, during a later restoration intervention, significant areas of the background were overpainted.

Combined non-invasive, bulk and analytical microscopy techniques were used in this study. When justified samples were taken and cross-sections of these prepared and studied by analytical microscopy and bulk analysis (light microscopy (LM), Scanning Electron Microscopy coupled with Energy Dispersive X-ray spectroscopy (SEM/EDX), Gas Chromatography Mass spectrometry (GC/MS) and Fourier Transform Infrared spectroscopy (FTIR) and FTIR imaging.

Non-invasive X-ray fluorescence spectroscopy (XRF) identified in both examples the metal as brass. XRF mapping (Artax 800) on representative areas of the overpainted background in the painting by Franzoni could detect copper and zinc originating from a lower layer indicating that the brass powder had been used extensively in the background in Franzoni's original application. This was confirmed by preparation and analysis of a paint cross-section where powdered brass (heavily saponified) was detected in a paint layer below the current surface layer.

LM and SEM/EDX analysis of the cross-section surface confirmed that the metallic particles were brass with a relatively high copper content (approx. 75:15 Cu:Zn) had an elongated shape suggesting it originated from powdered brass leaf. SEM/EDX also detected chlorine associated with the metal particles compatible the use of sodium chloride as an aid in the grinding process.

Furthermore, it was established by FTIR and GCMS of the agglomerates and FTIR imaging of the cross-sections that the green agglomerates were composed of a combination of copper and zinc carboxylates (soaps) and often still contained metallic brass in its core. This clearly indicated that the green copper/zinc soaps

resulted from the reaction between the fatty acids of the oil binding medium and the copper and zinc of the brass powder originally used by Hodler and Franzoni. Details of the analytical characterization of the copper and zinc carboxylates will be given in the paper and the role of the chlorine as catalyst in this saponification is being explored by examination of further examples.

The instability and reactivity of the brass powder disrupts the initial intention of the artists of bringing luminosity to the painting surface, by severely darkening and dulling it. Probably in the same year (around 1885) Ferdinand Hodler made a replica of this painting and interestingly no longer used brass powder but created luminosity by a different choice of pigments. In the case of the *Portrait of a young maid* Franzoni himself extensively overpainted the areas where metal powder had been used. Both these two facts are possibly an indication that the alteration of the brass powder occurs soon after application.

Although a significant number of paintings from these two artists have been studied, in only one other painting by Hodler, entitled *Autumn evening* (1892-94) was brass powder identified.

Our preliminary results suggest that the high instability already experienced by the artist might be the reason for the seldom use of this powder. Alternatively the high instability hinders the recognition of the brass powder and therefore the report of its use in literature. We aim to bring awareness to this issue.

NON-INVASIVE IDENTIFICATION OF PIGMENTS, TECHNOLOGY AND PAINTING TECHNIQUE USED BY MAKSYMILIAN GIERYMSKI, A REPRESENTATIVE OF THE MUNICH ARTISTIC CENTER IN THE SECOND HALF OF THE NINETEENTH CENTURY

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Introduction

The scientific examination and comparative investigation of pigments is fundamental to further understanding and analysis of historic and artistic works, and particularly useful for conservators. This study is focussed on the use of non-invasive analytical techniques to increase the knowledge of the painting technique of Maksymilian Gierymski (1846-1874), one of the most significant Polish painters and a member of the Munich artists' community in the second half of the nineteenth century.

Gierymski studied at the Royal Academy of Fine Arts in Munich (1867-1868). He played a leading role in the community of Polish artists. He was known for his battle paintings, though he also painted a large number of landscapes and genre scenes. He was a very successful painter in Western Europe and in 1868 was elected a member of the Munich Kunstverein. He also won awards at exhibitions in Berlin (1872) and Vienna (1873). His works are characterised by subtle realistic observation and lyrical mood.

The aim of this study was to assess the technology, painting technique and materials used by the artist. During the study, 35 oil paintings of Maksymilian Gierymski housed in several Polish museums were analyzed. Research in the field of science and conservation of artworks based solely on non-invasive and non-destructive methods was performed. For each painting, a series of images