FINE ART DETECTIVE

CODEX OF INVESTIGATIONS

THE SERACINI REPORT

SCIENTIFIC ANALYTICAL INVESTIGATION

Analytical Diagnostics on "Joseph and Potiphar's Wife," Attributed to Tiziano

MAURIZIO SERACINI

EDITECH S.R.L. - FLORENCE
2005

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Maurizio Seracini

EDITECH S.r.l. - Centro diagnostico per i Beni Culturali

Florence, Italy - March 2005

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REPORT NAVIGATOR

The complete original EDITECH report follows.

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Diagnostic Investigation on *"Joseph and Potifar's wife "* attributed to Titian

Oil on canvas cm 125 x 102

Ing. Maurizio Seracini

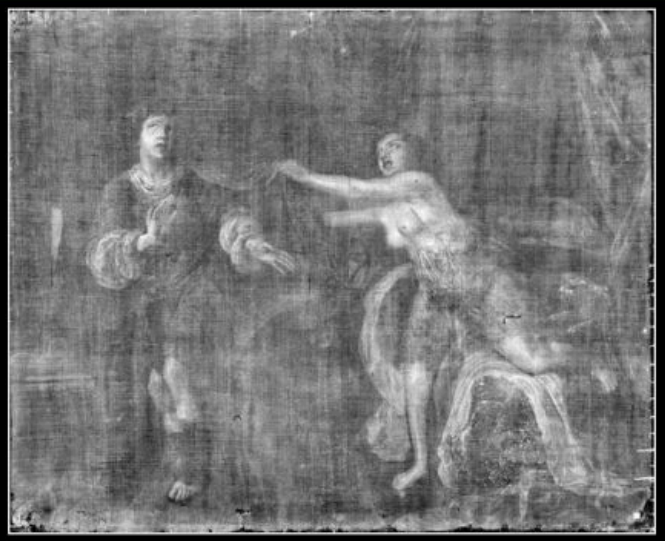
Cod. Ed. P1320
Firenze, March 2005

- DIAGNOSTIC IMAGING
  - Technique
  - Conservation
- ANALYTICAL DIAGNOSTICS
  - Cross-sections study by SEM-EDS, Micro-Raman Spectroscopy and FT-IR Spectroscopy
  - ^{210}Pb measurement by Gamma Spectroscopy on a Lead White sample
  - ^{14}C Dating of a wood sample
- CONCLUDING REMARKS

DIAGNOSTIC IMAGING

"Joseph and Potifar's wife"

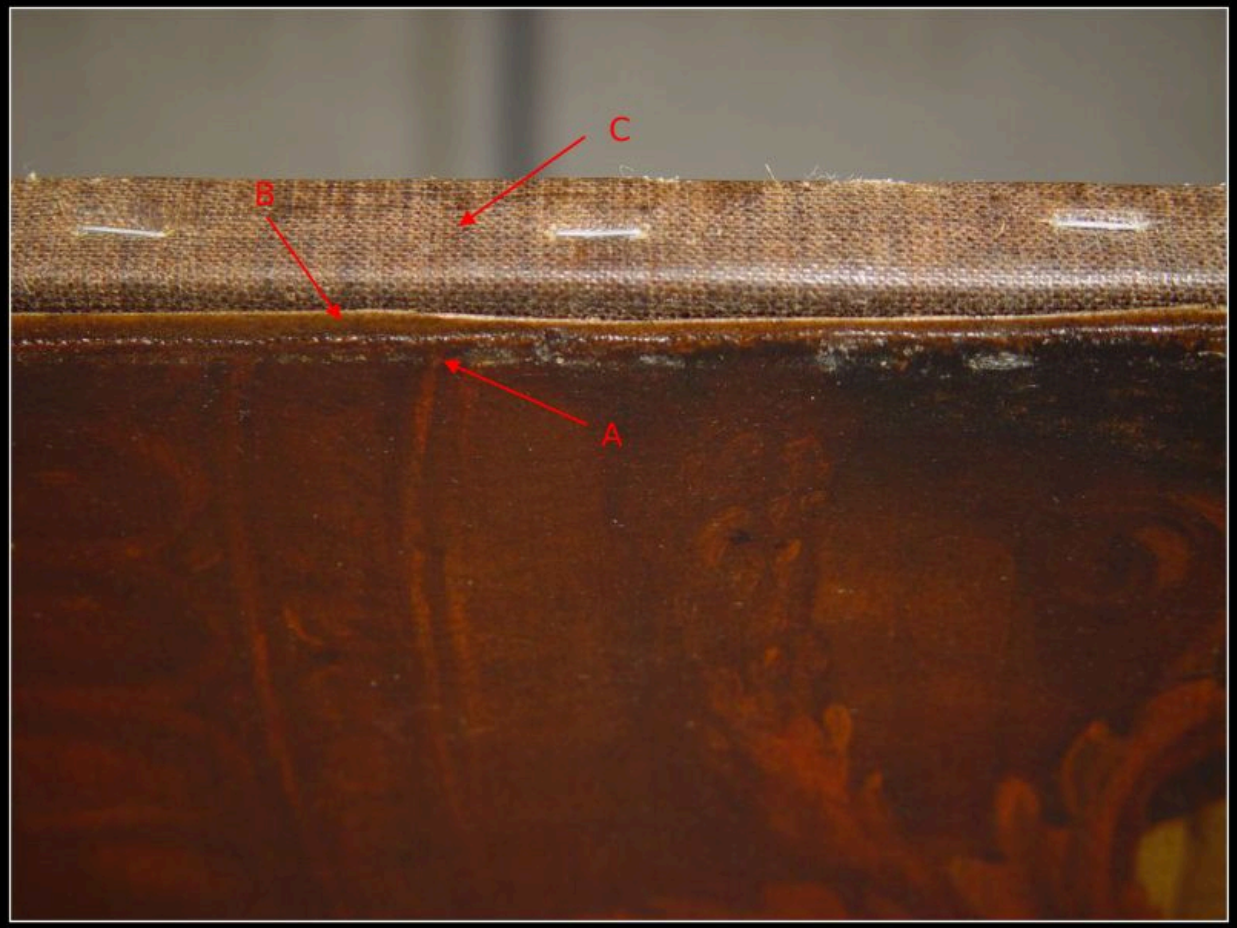
Visible light



X-Ray Radiography

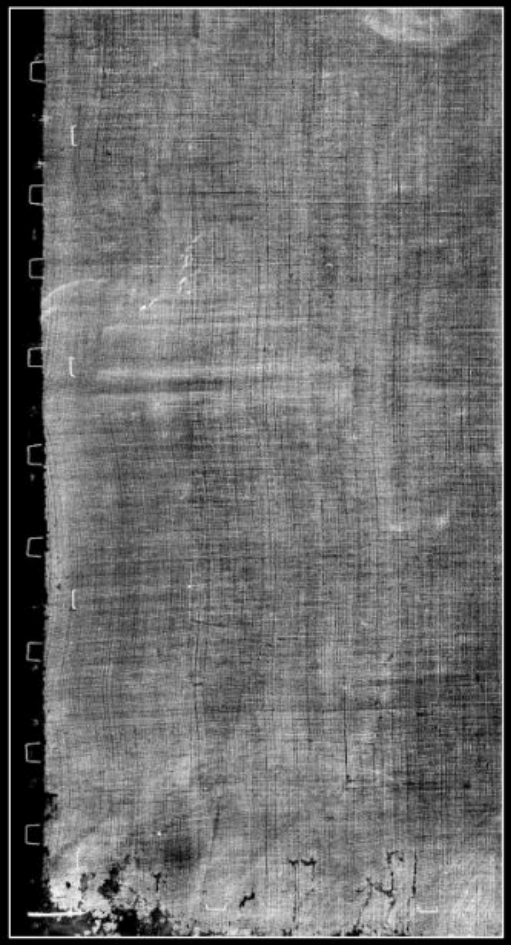
IR Reflectography

UV Fluorescence



Under the original canvas (A) two relinings are clearly visible (B,C). Since the dimensions of the painting are smaller than the stretcher on which is fixed, the stretcher cannot be considered the original one.

Visible light - Detail



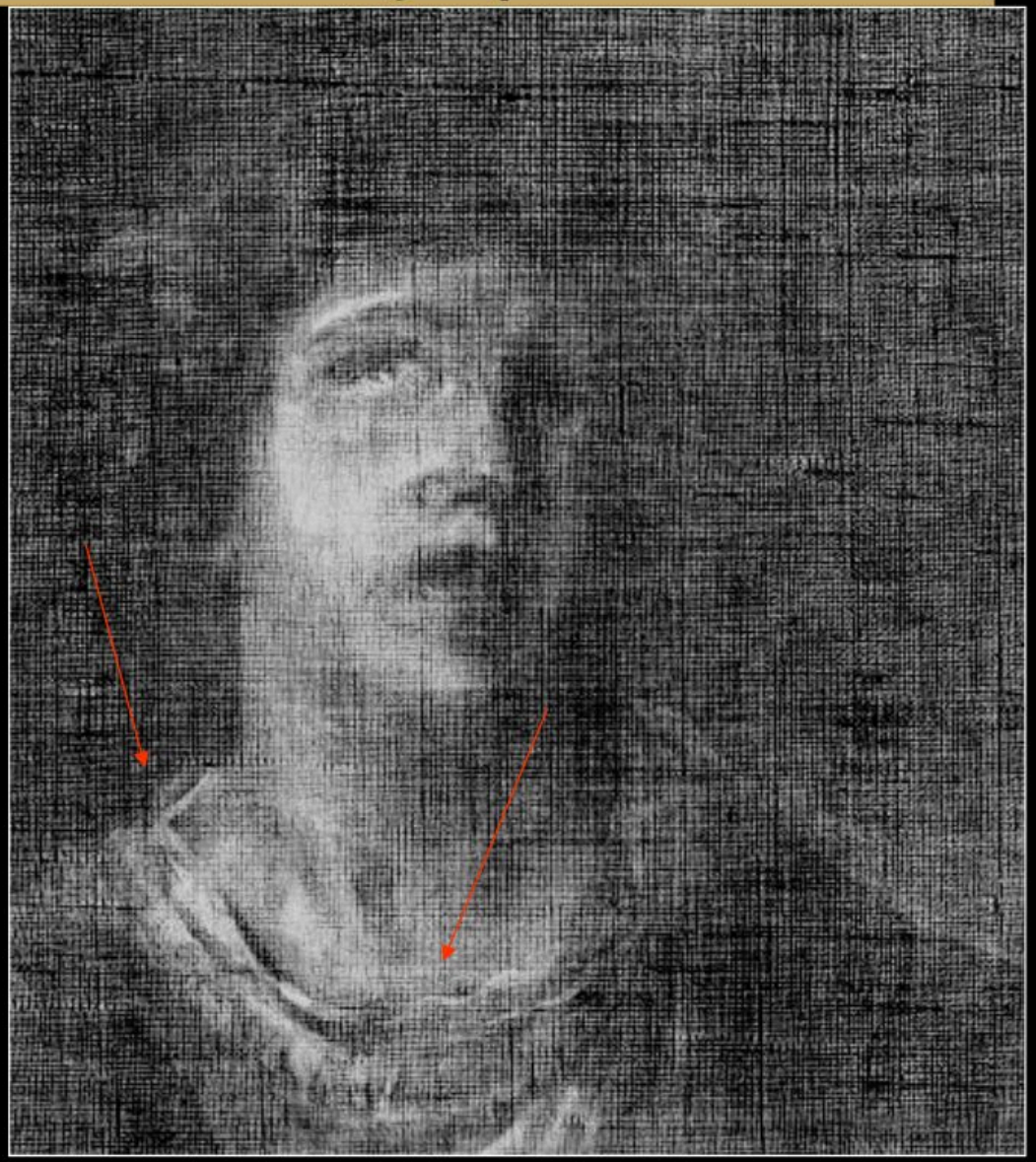
X-Ray Radiography - Detail

IR Reflectography - Detail

The vase in the left lower corner was painted over the pillar, as the IR image shows

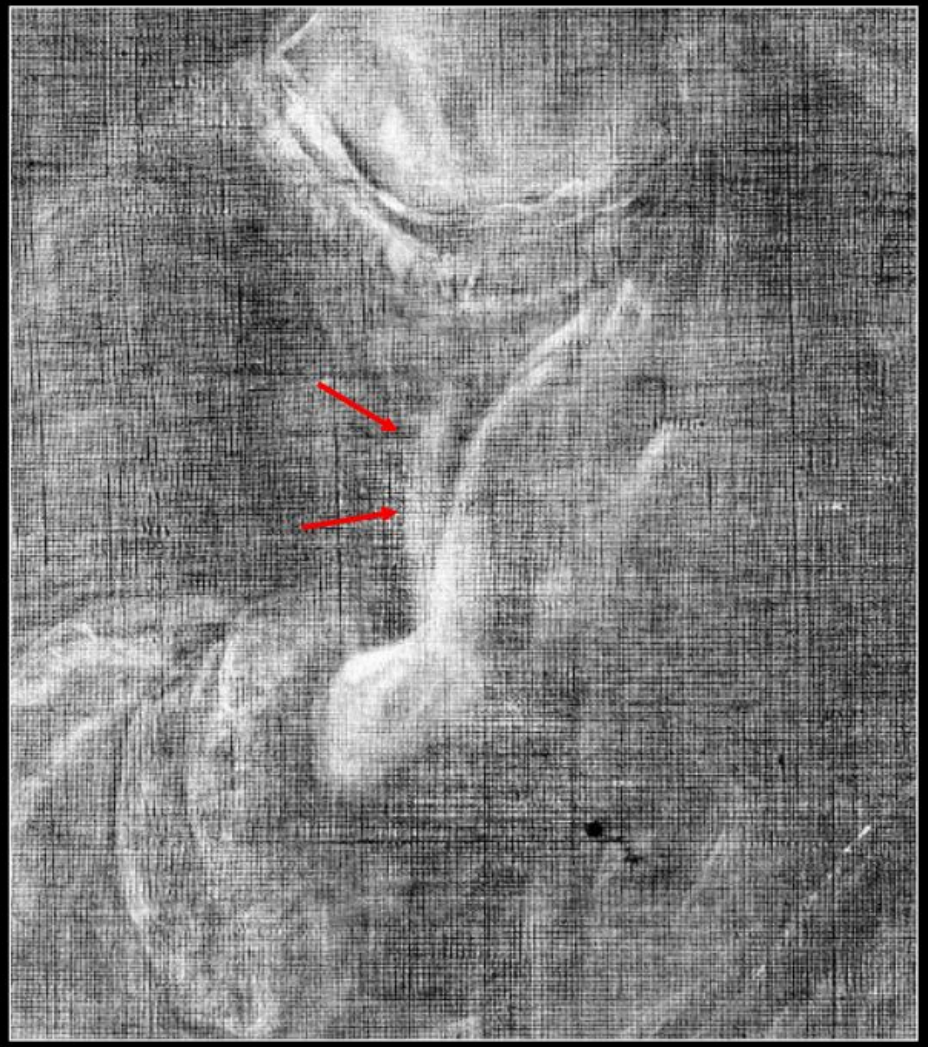
Joseph and Potifar's wife

X-Ray Radiography



Small differences in the collar profile are recognizable in the X-Ray image

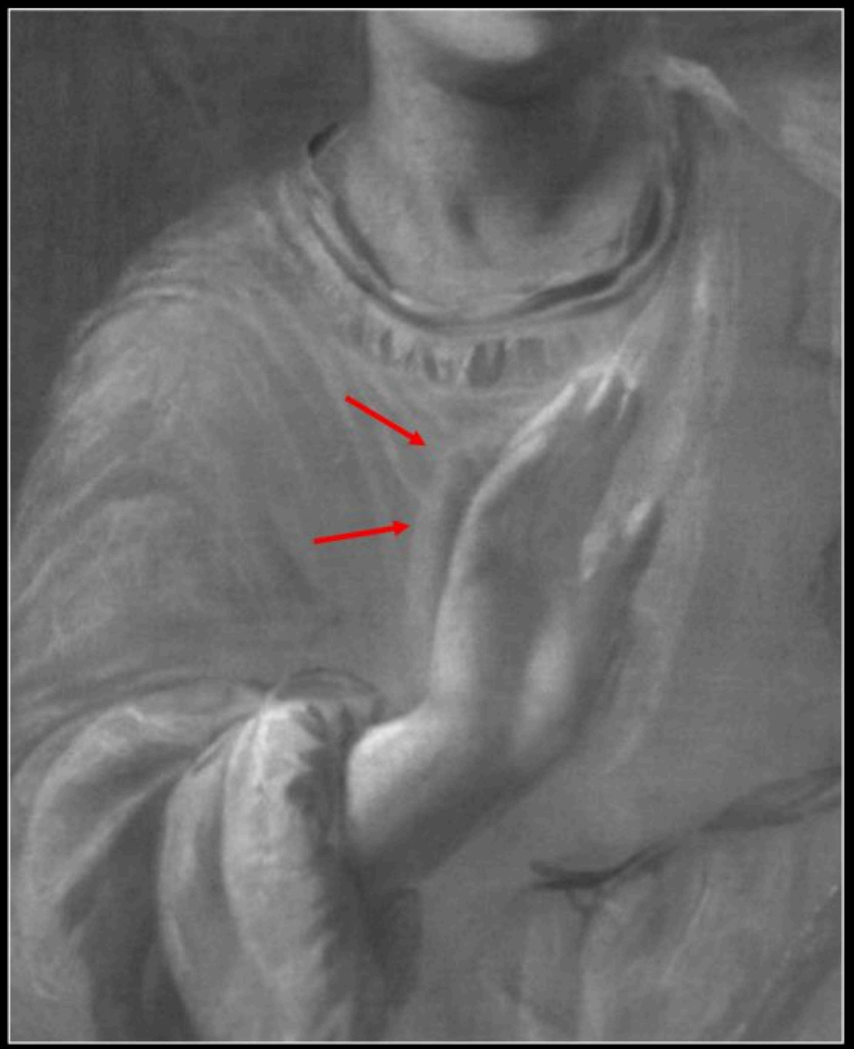
Visible light - Detail



X-Ray Radiography - Detail

The right hand of Joseph was initially painted slightly to the left of the position visible today, as revealed by the X-ray image

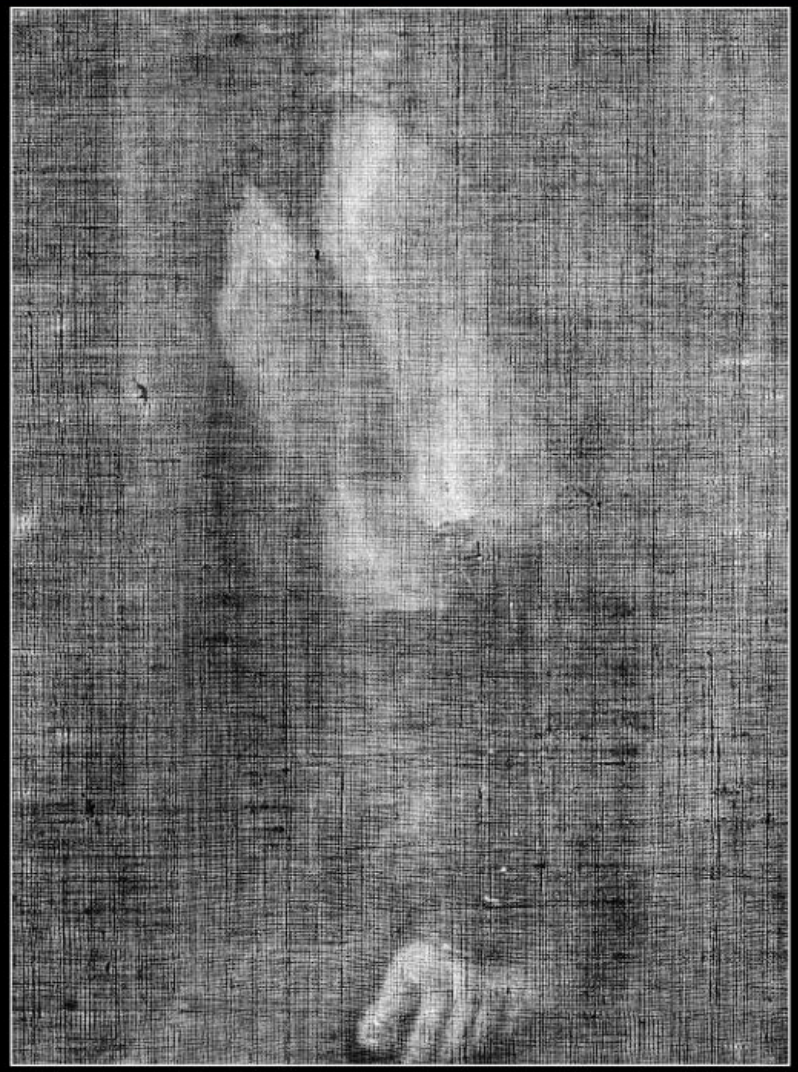
Visible light - Detail



IR Reflectography - Detail

Such pictorial change was done before the red robe was painted, as the IR Reflectogram shows.

Visible light - Detail



X-Ray Radiography - Detail

The X-Ray exam revealed another "Pentimento" in the left leg of Joseph. Initially, the artist painted it shifted to the left.

Visible light - Detail

The brown red paint of the floor which covers the Pentimento of the left leg is not transparent to IR. Consequently, the original position of the leg of Joseph cannot be made visible with IR Reflectography. On the other hand, it should be noticed how the the layout of the footware of the right foot is barely visible due to a higher degree of transparency of the paint used.

IR Reflectography - Detail

Visible light - Detail

The X-ray image of the legs of Joseph shows how the artist used lead based pigment to paint both versions of the left leg but not the right one.

X Ray Radiography - Detail

Visible light - Detail

Other changes are visible in the layout of the legs of the table. In addition, thin black lines draw the wood planks layout of the floor under the carpet.

IR relfectography - Detail

Visible light - Detail

IR Reflectography - Detail

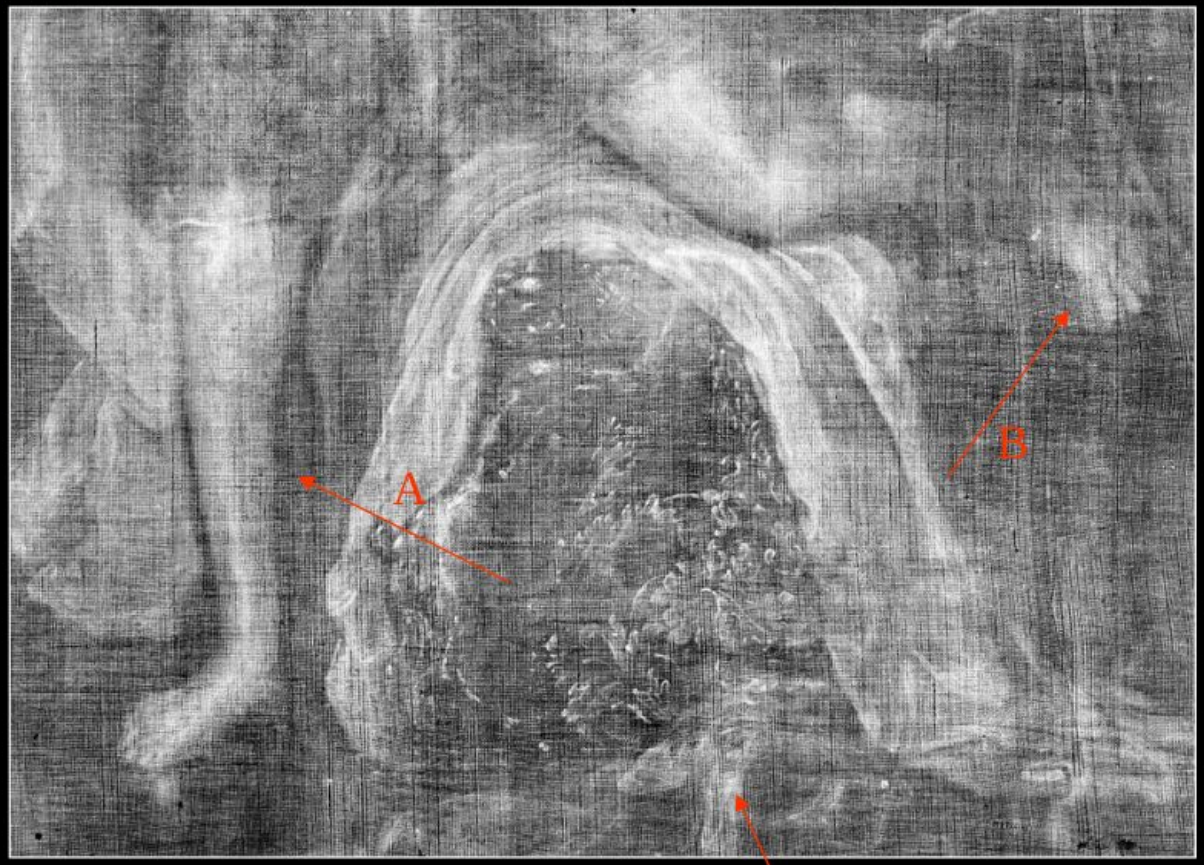
The reflectogram of the wall behind Joseph shows an elaborate drawing of flowers done with a brush.

Along the left side of Joseph 's face, it appears a second larger the profile. Slight changes along the upper profile of the red robe are visible. Both changes appears to be made after the wall decoration was already completed.

Visible light - Detail

Painting changes along the inner profile of the right leg of Potifar's wife (A) are shown by the X-Ray image.

In the left foot, one more toe is also visible (B).On the floor, carpet's details are made visible under the dark paint (C).



X-Ray Radiography - Detail

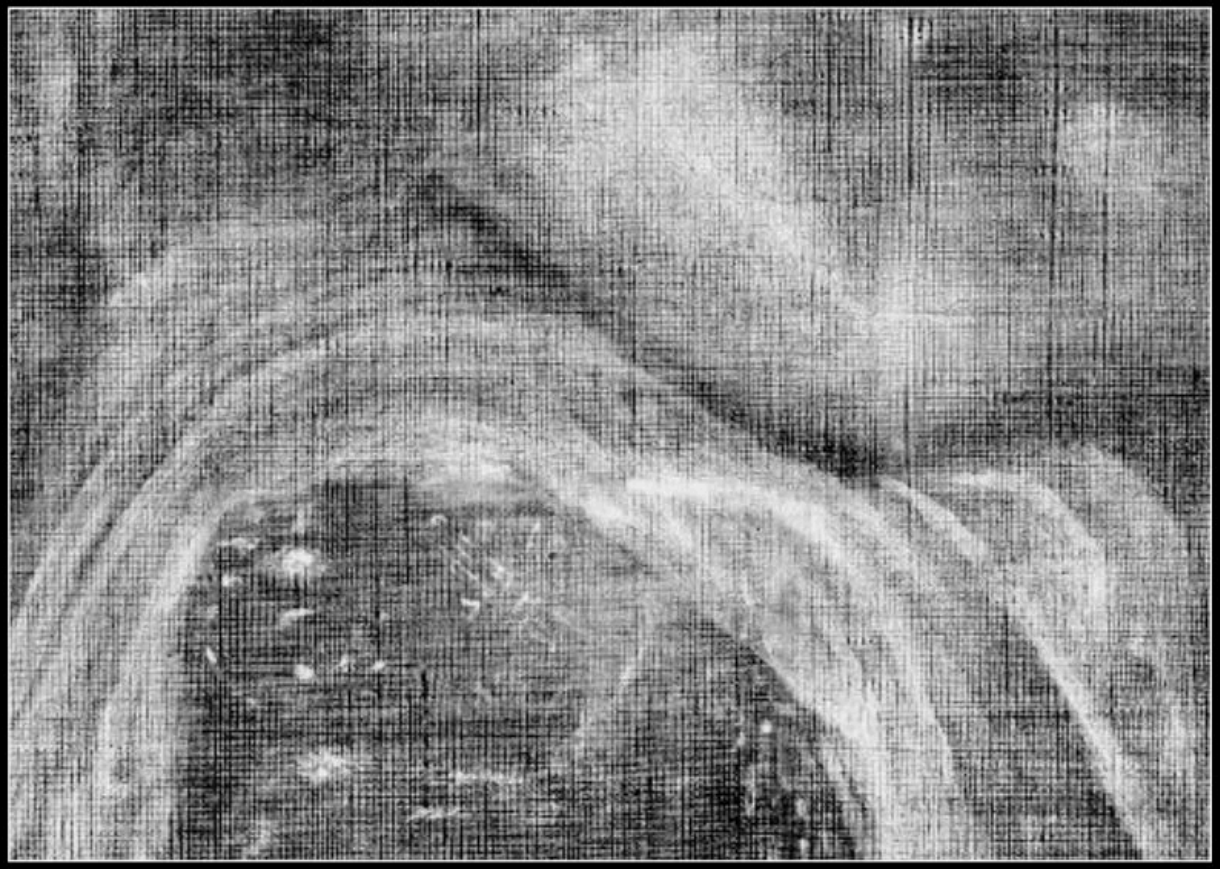
Visible light - Detail

Initially, the calf of the right leg of the woman was covered by the bed sheets

IR Reflectography - Detail

Visible light - Detail

The X-Ray image shows how the folds of the bed sheets were painted around the left leg of the woman.

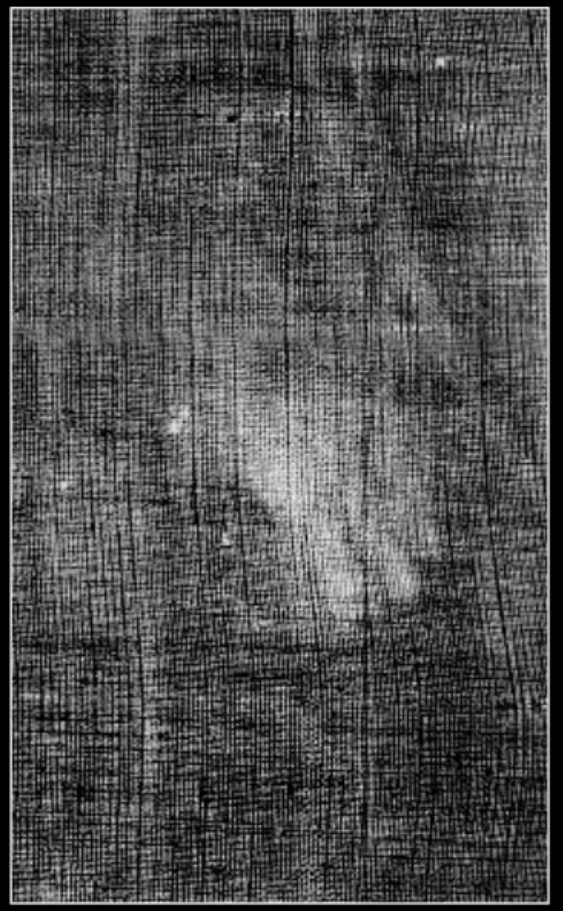


X-Ray Radiography - Detail

Visible light - Detail

In the X-Ray and in the Reflectogram, a bigger version of the foot shows up under the final layout.

IR Reflectography - Detail



X-Ray Radiography - DEtail

Visible light - Detail

Under the paint of the blanket and of the curtain, a dog is made visible in the X-Ray. It should be noticed how the dog is completely defined in all details, including the highlights

X-Ray Radiography - Detail

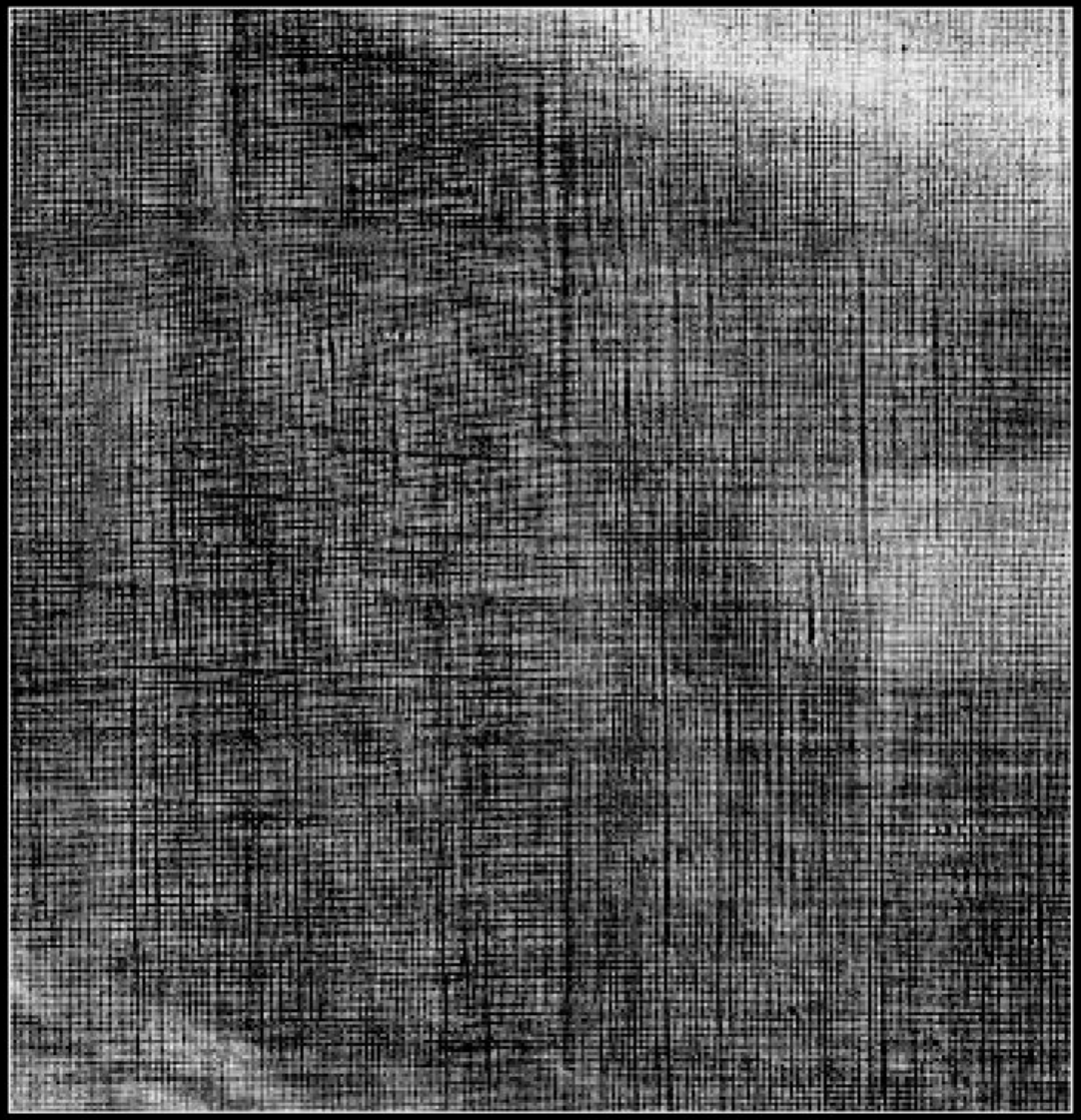
Visible light - Detail

The dog is only partly visible in the Reflectogram. The folds of the robe of the woman go over the dog, indicating how this was part of the original layout of the painting.

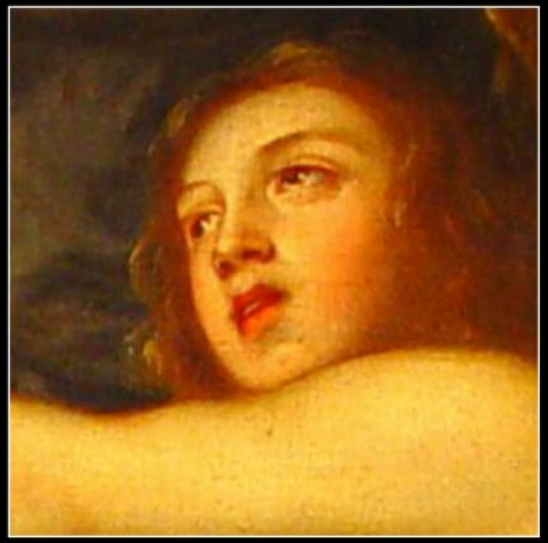
IR Reflectography - Detail

Visible light - Detail

From the X-Ray detail it appears as if the artist had painted the left arm of the woman only up to her wrist, since it was going to be covered by the red cloak



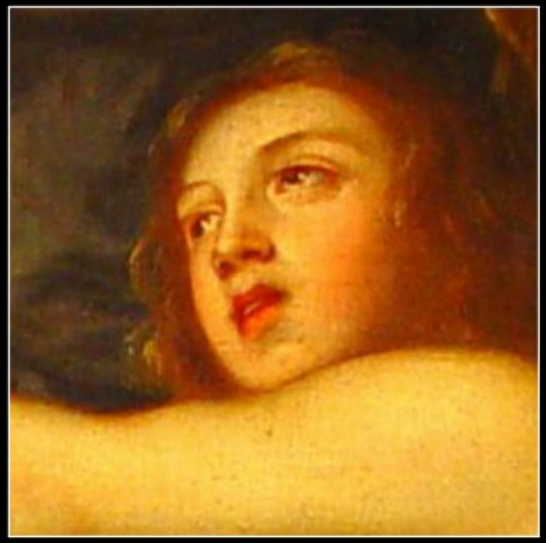
X-Ray Radiography



Visible light - Detail

The X-Ray shows how the profile of the woman's chin doesn't overlap but follows her left arm. Her left eye looks more to the left side than the one today visible.

X-Ray Radiography - Detail



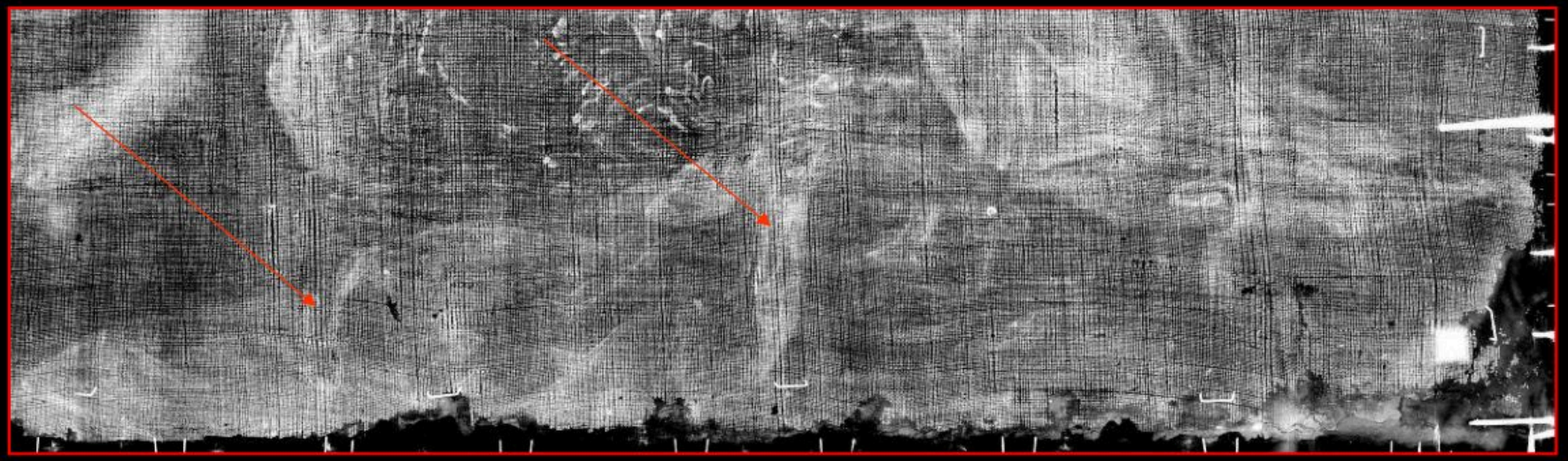
Visible light - Detail

In the Reflectogram, the hair are much longer and more fluent than in the X-ray image, indicating two painting phases as seen in other parts of the painting.

IR Reflectography - Detail

Visible light

The X-Ray shows the detailed layout of all the folds of the dark bedspread in the lower foreground, made visible by the lead white content in the paint mixture.

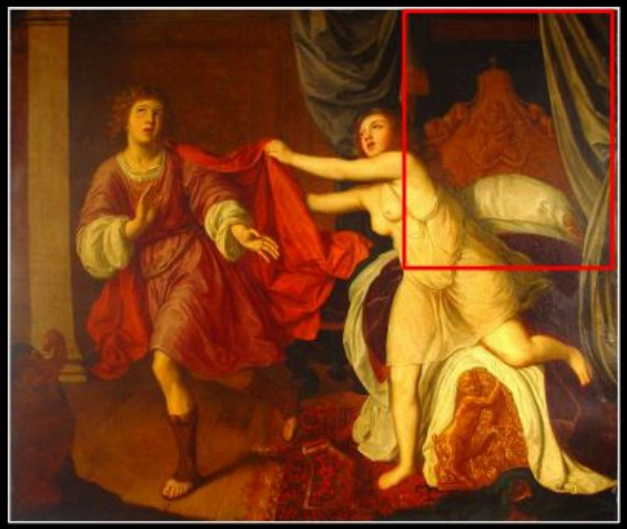


X-Ray Radiography - Detail

Visible light

The Reflectogram shows that Joseph's red robe has areas of higher IR absorption just like the floor (grey areas). It is presumed that these areas are related to a second painting phase.

IR Reflectography - Detail



Visible light

Details of the wall in the background (probably the lower portion of a window) are visible in the Reflectogram.

IR Reflectography - Detail

Visible light

The X-Ray image shows that the folds of the dress covering the hips and belly of Potifar's wife are finely painted, while the folds on the thighs are hardly recognizable, suggesting two painting techniques and possibly two painting phases.

X-Ray Radiography - Detail

Joseph and Potifar's wife

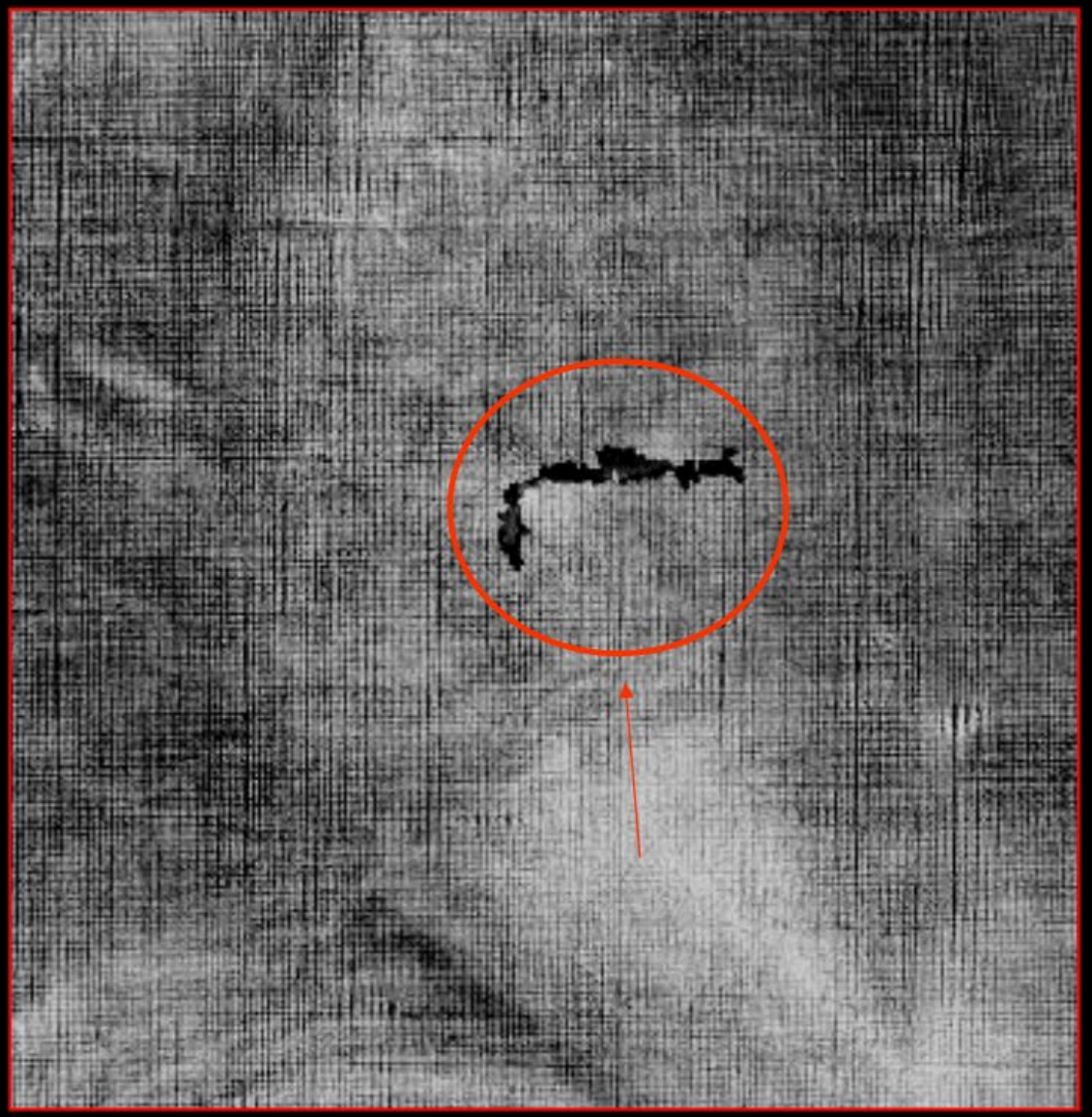
Visible light - Detail

The painting has suffered paint losses mainly along the bottom (dark areas) area. Minor losses are also due to scratches (see detail)._

X-Ray Radiography

Visible light

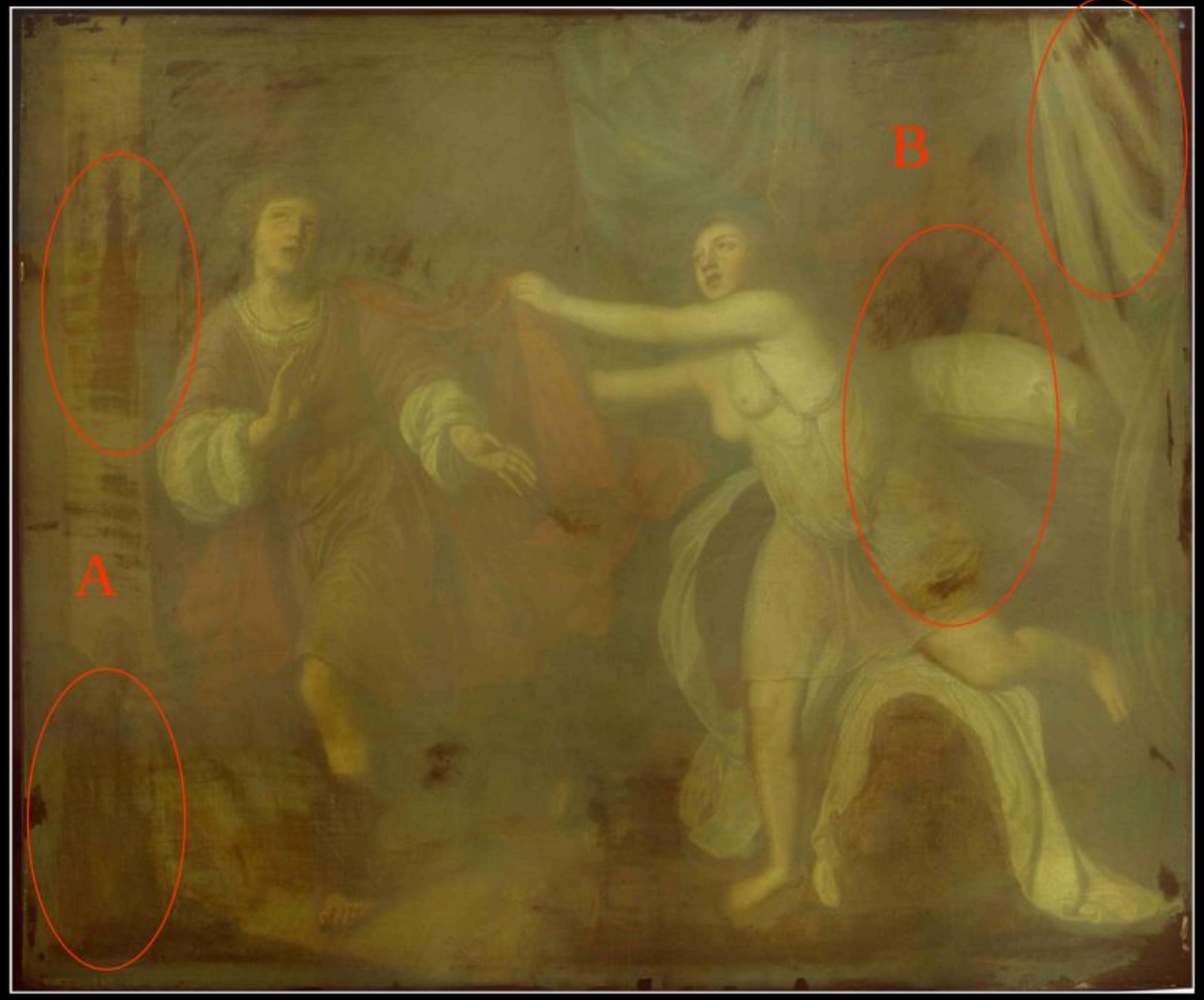
Detail of the scratch



X-Ray Radiography - Detail

Visible light - Detail

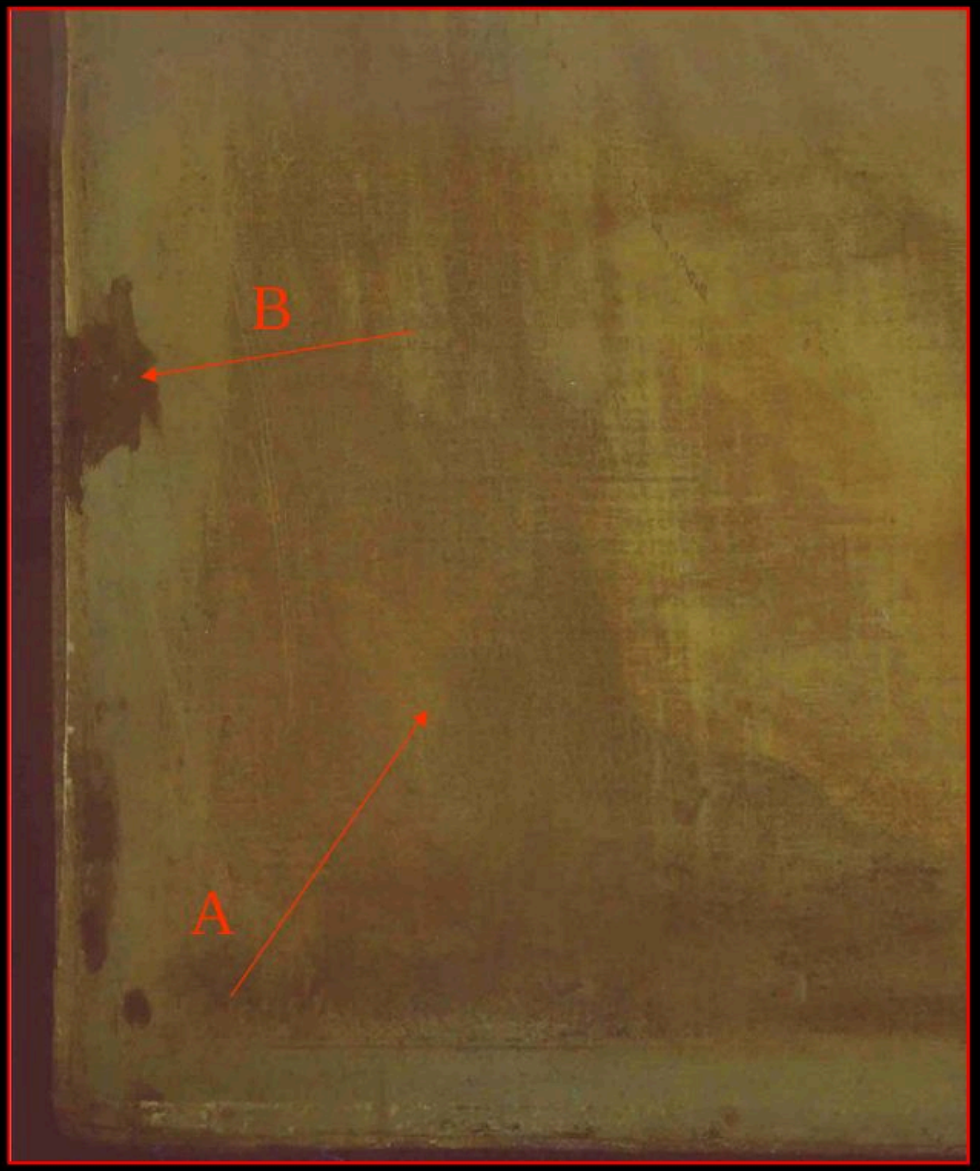
The painting has undergone at least two restorations. The former, is recognizable in the UV Fluorescence image by the pale dark patches placed under the layer of superficial varnish (A). The latter by the darker areas over the varnish (B).



UV Fluorescence

Visible light - Detail

Detail of areas related to the first restoration (A) and second restoration (B)



UV Fluorescence

Visible light

Detail of areas related to the first restoration (A) and second restoration (B)

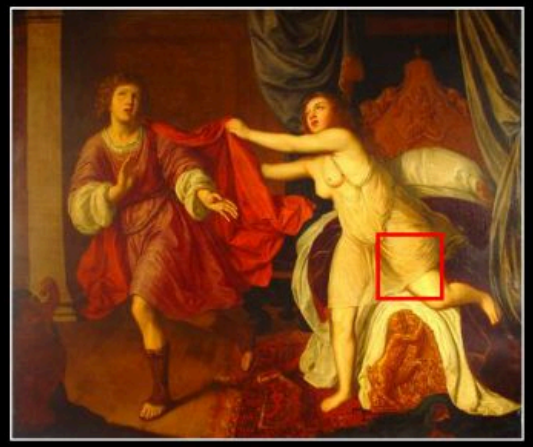
UV Fluorescence

Visible light

Detail of areas related to the first restoration (A) and second restoration (B)

UV Fluorescence

Joseph and Potifar's wife



Visible light

Detail of areas related to the restoration (B) over the superficial varnish

UV Fluorescence

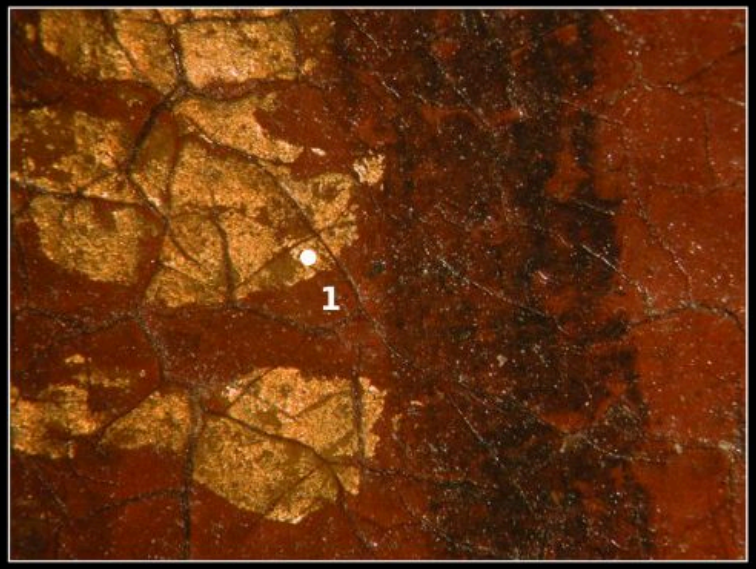
ANALYTICAL DIAGNOSTICS

Location of samples

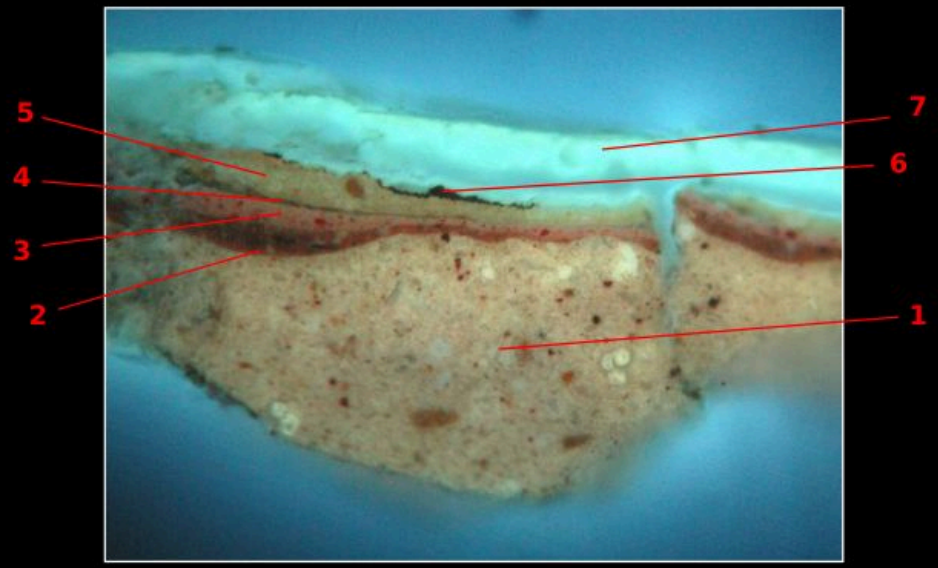
Joseph and Potifar's wife

Sample 1

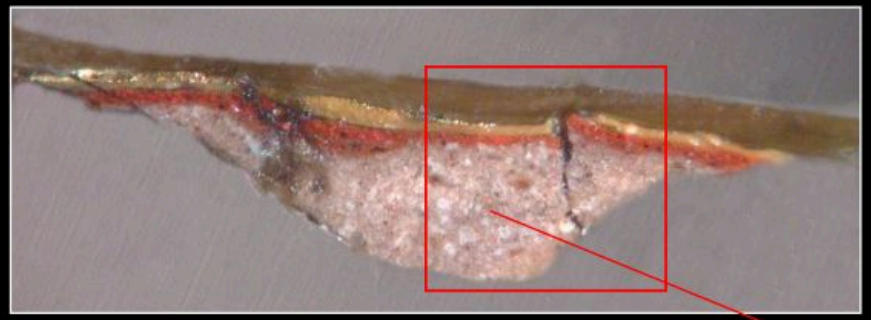
Sample 1 – Cross section, Reflected Light



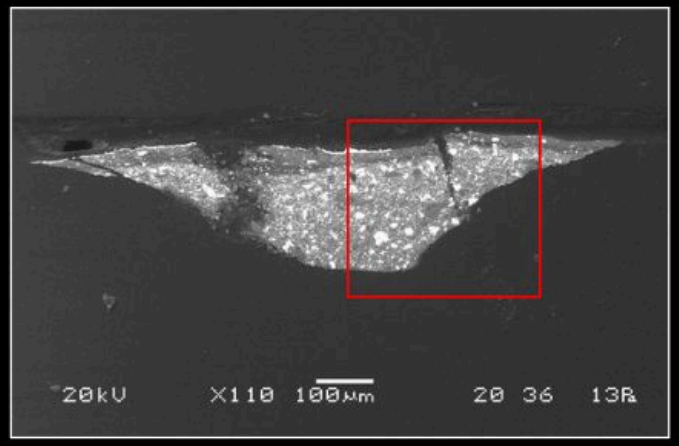
Sample 1: detail



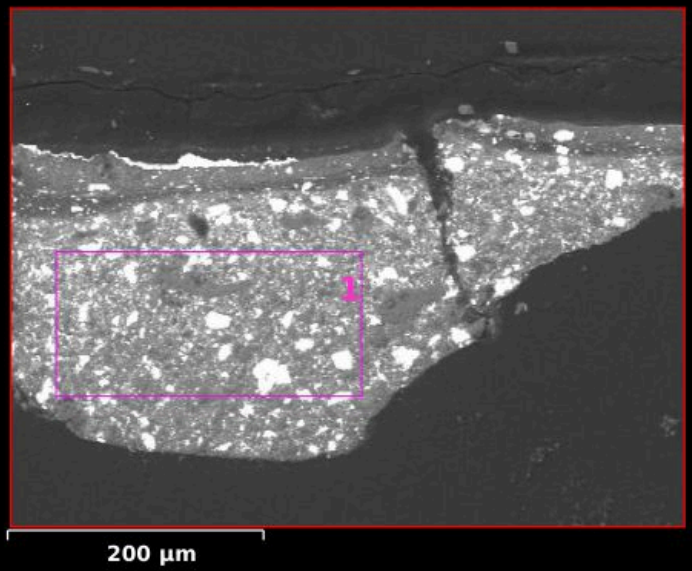
Sample 1 – Cross section, UV Fluorescence



Sample 1 – Cross section, Reflected Light

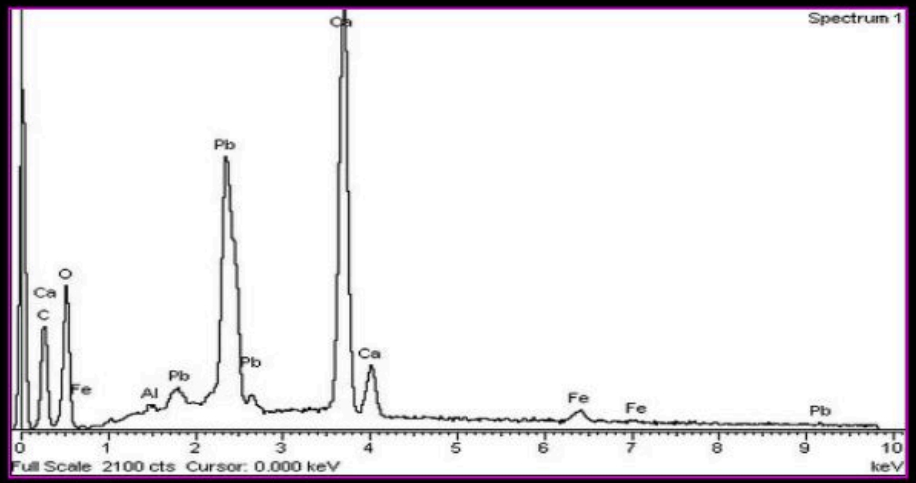


Sample 1 – Cross section, SEM back scattered electron image



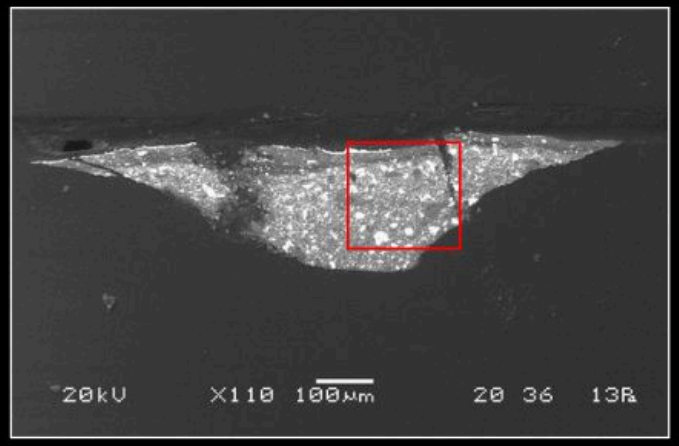
Sample 1 – Cross section, SEM. Area 1 microanalysis

Area 1: presence of Ca and Pb are associated to Calcite ($CaCO_3$) and Lead White ($2PbCO_3 \cdot (OH)_2$).

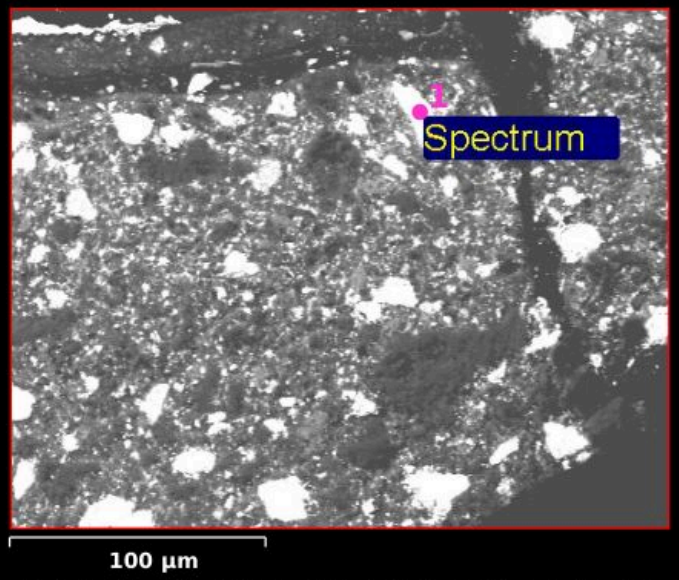


Sample 1 – Cross section, SEM – EDS. Area 1 microanalysis

Sample 1 – Cross section, Reflected Light

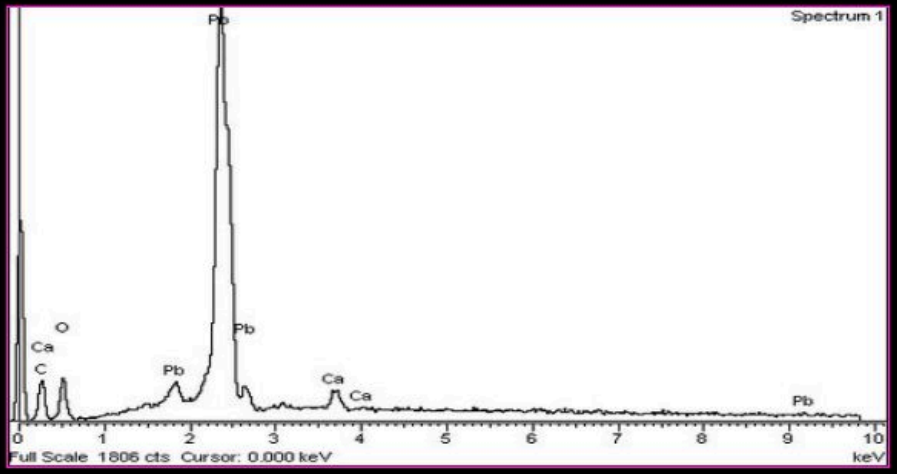


Sample 1 – Cross section, SEM back scattered electron image



Sample 1 – Cross section, SEM. Point 1 microanalysis

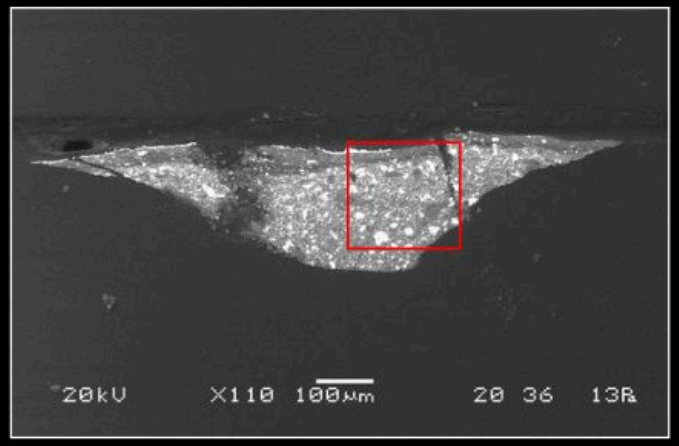
Pb confirms the presence of Lead White ($2PbCO_3 \cdot (OH)_2$) in layer 1.



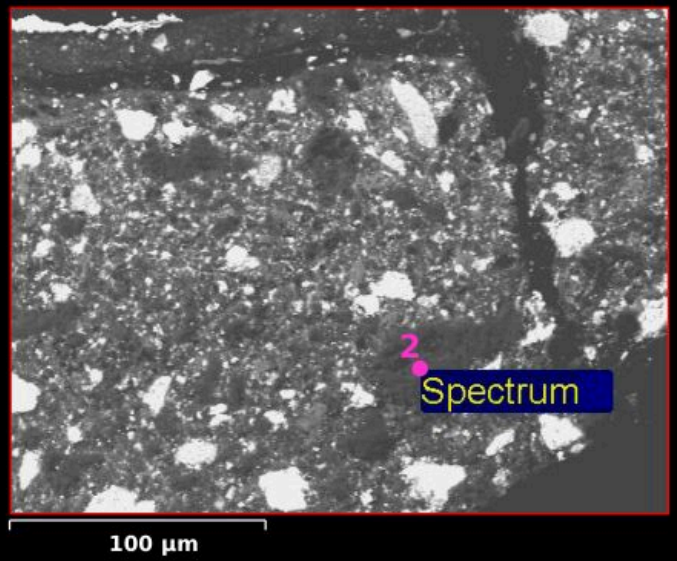
Sample 1 – Cross section, SEM – EDS. Point 1 microanalysis

Joseph and Potifar's wife

Sample 1 – Cross section, Reflected Light

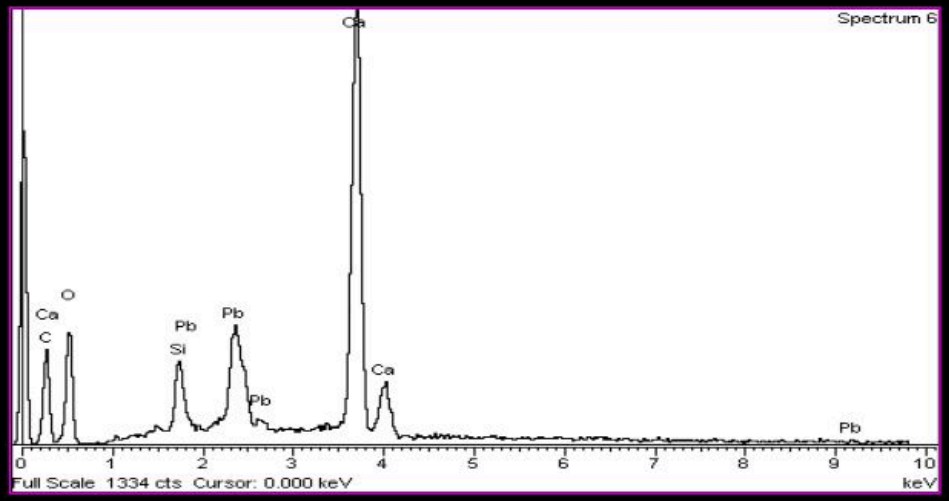


Sample 1 – Cross section, SEM back scattered electron image



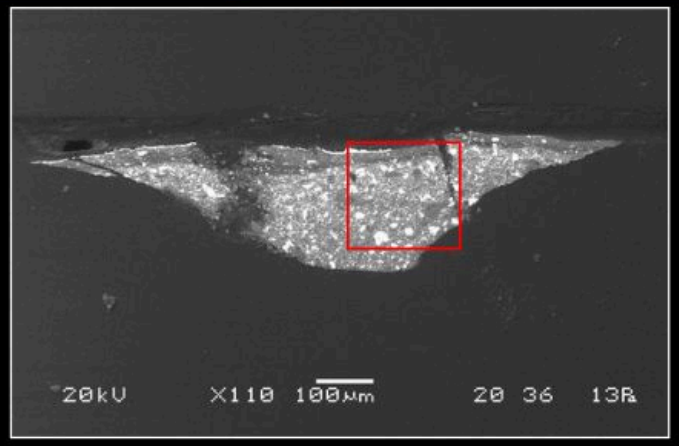
Sample 1 – Cross section, SEM. Point 2 microanalysis

The presence of Ca is due to Calcite ($CaCO_3$).

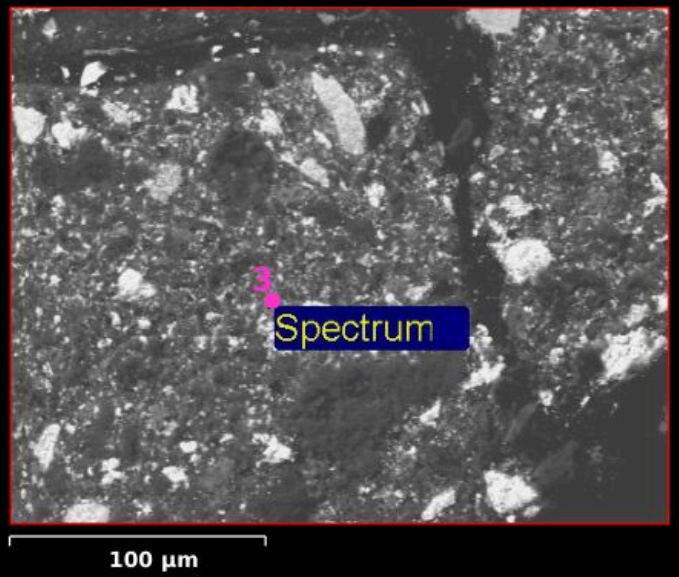


Sample 1 – Cross section, SEM – EDS. Point 2 microanalysis

Sample 1 – Cross section, Reflected Light

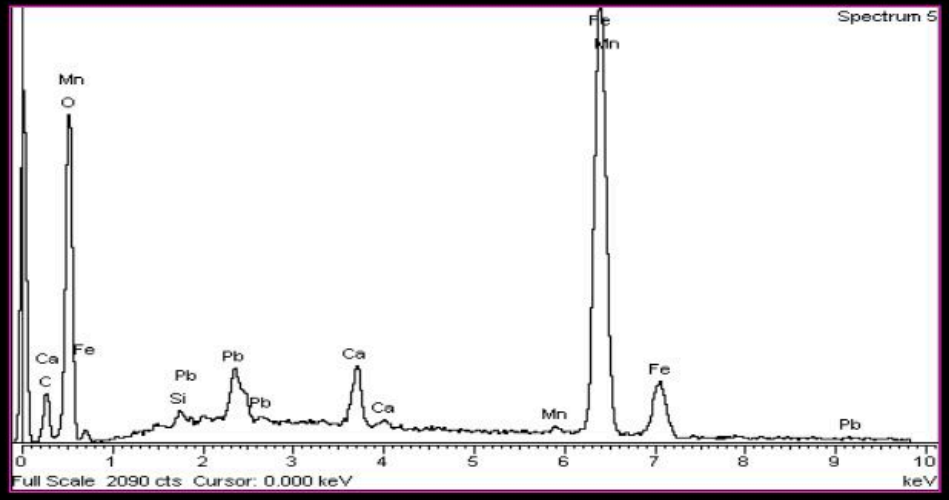


Sample 1 – Cross section, SEM back scattered electron image



Sample 1 – Cross section, SEM. Point 3 microanalysis

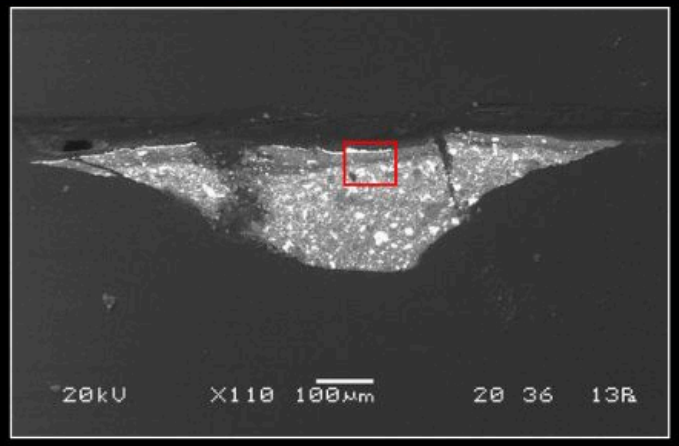
The presence of Si, Fe and Mn is due to Earth pigments.



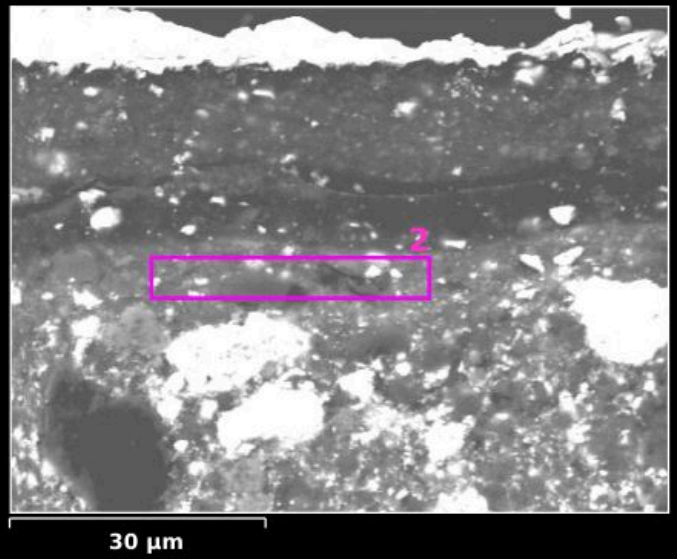
Sample 1 – Cross section, SEM – EDS. Point 3 microanalysis

Joseph and Potifar's wife

Sample 1 – Cross section, Reflected Light

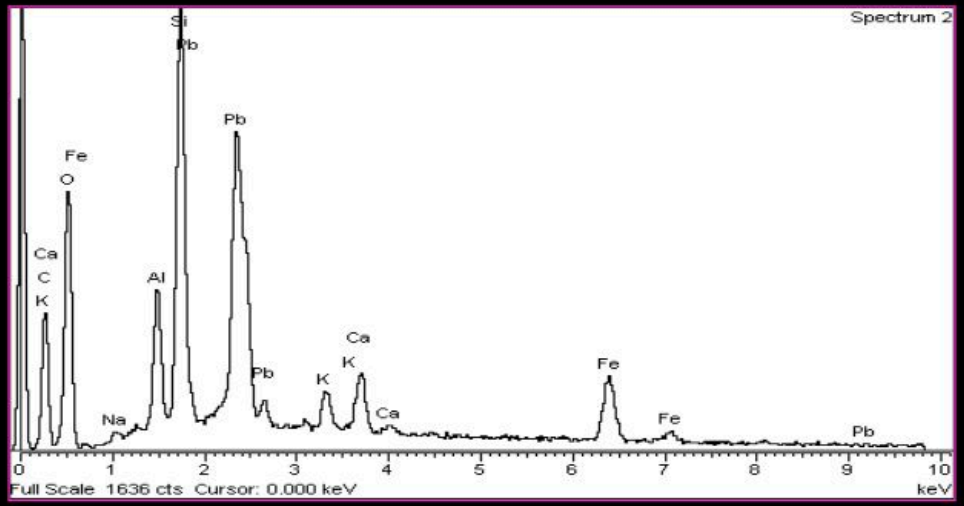


Sample 1 – Cross section, SEM back scattered electron image



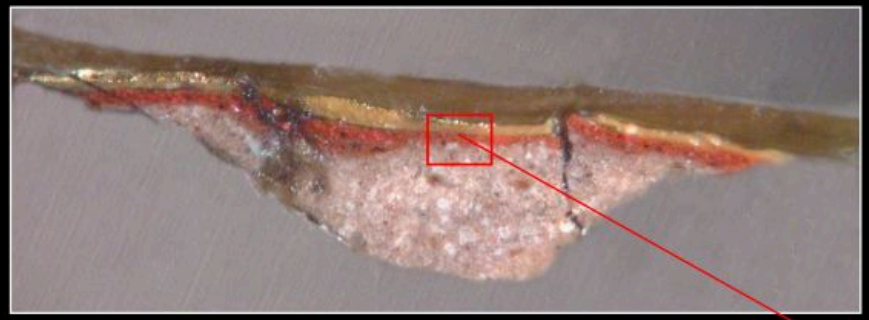
Sample 1 – Cross section, SEM. Area 2 microanalysis

Area 2: presence of Pb is associated to Lead White ($2PbCO_3 \bullet (OH)_2$). Al, Si and Fe to Earth pigments.

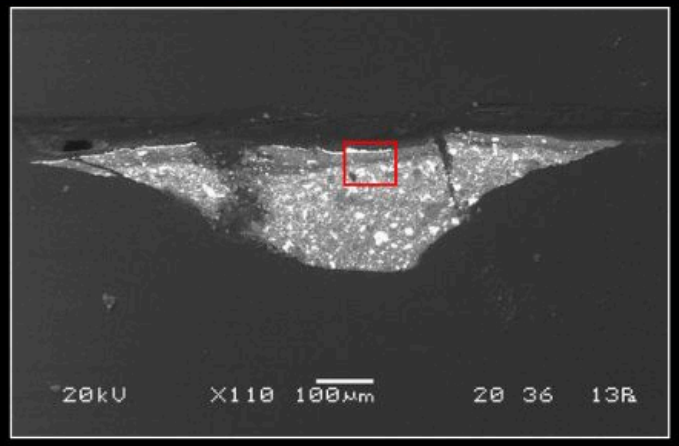


Sample 1 – Cross section, SEM – EDS. Area 2 microanalysis

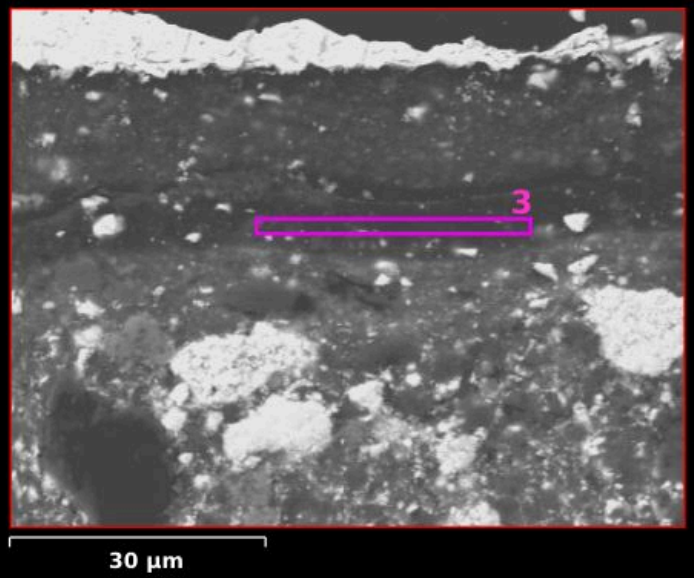
Joseph and Potifar's wife



Sample 1 – Cross section, Reflected Light

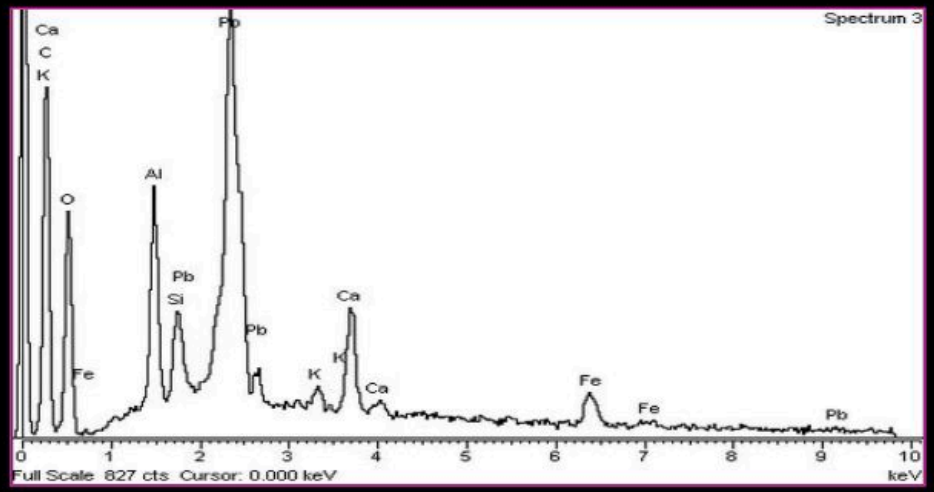


Sample 1 – Cross section, SEM back scattered electron image



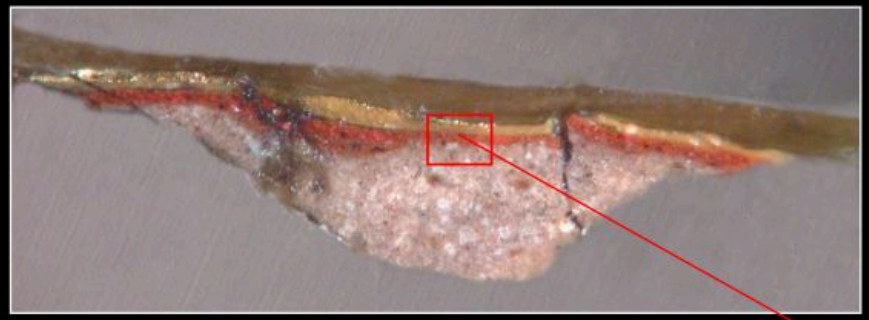
Sample 1 – Cross section, SEM. Area 3 microanalysis

EDS microanalysis of Area 3 revealed the presence of Pb related to Lead White ($2PbCO_3 \bullet (OH)_2$) and Al, Si, Fe to Earth pigments.

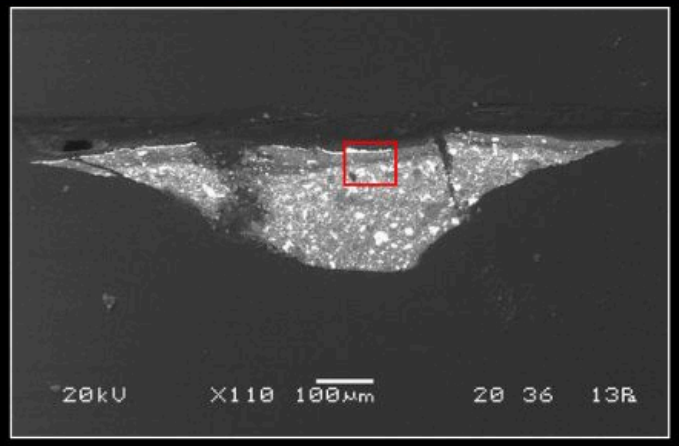


Sample 1 – Cross section, SEM – EDS. Area 3 microanalysis

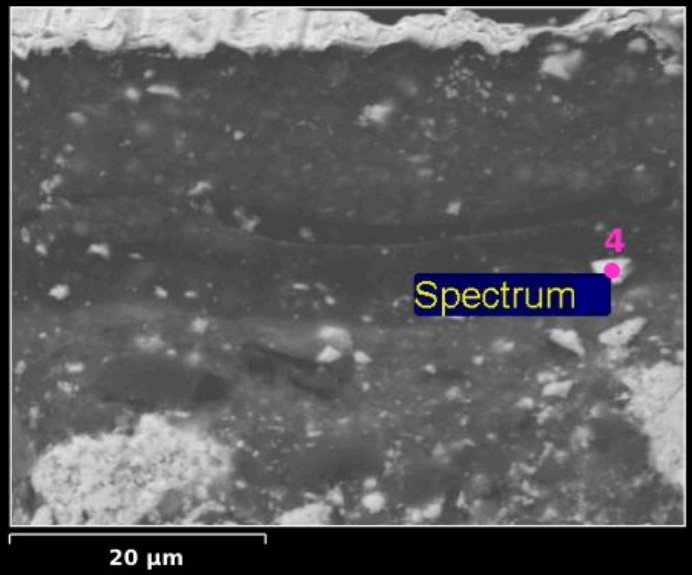
Joseph and Potifar's wife



Sample 1 – Cross section, Reflected Light

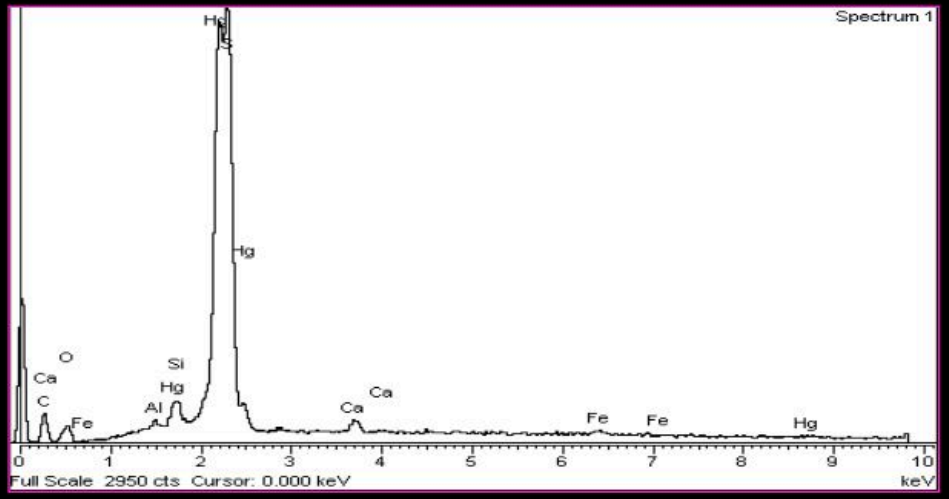


Sample 1 – Cross section, SEM back scattered electron image



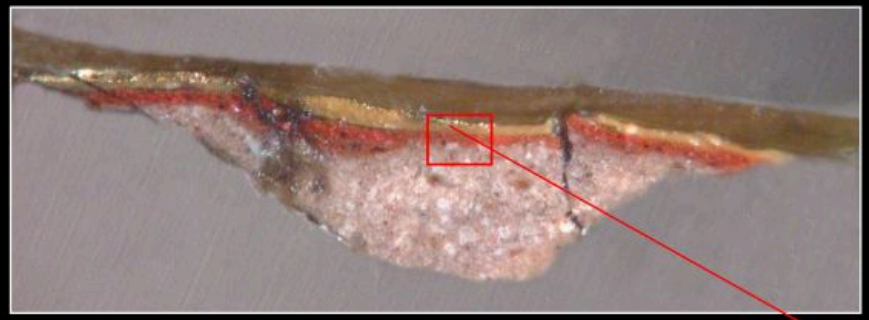
Sample 1 – Cross section, SEM. Point 4 microanalysis

The presence of Hg and S is due to Cinnabar (HgS).

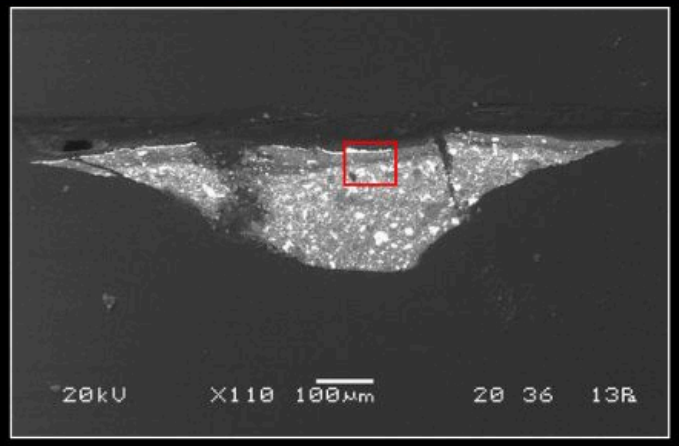


Sample 1 – Cross section, SEM – EDS. Point 4 microanalysis

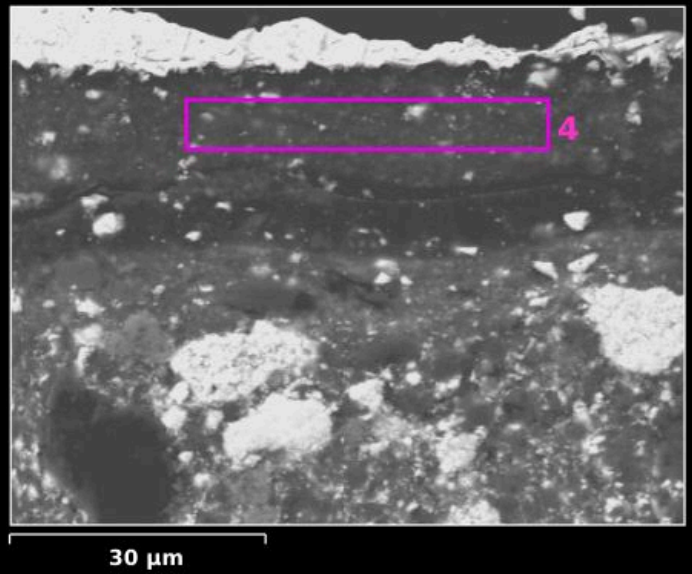
Joseph and Potifar's wife



Sample 1 – Cross section, Reflected Light

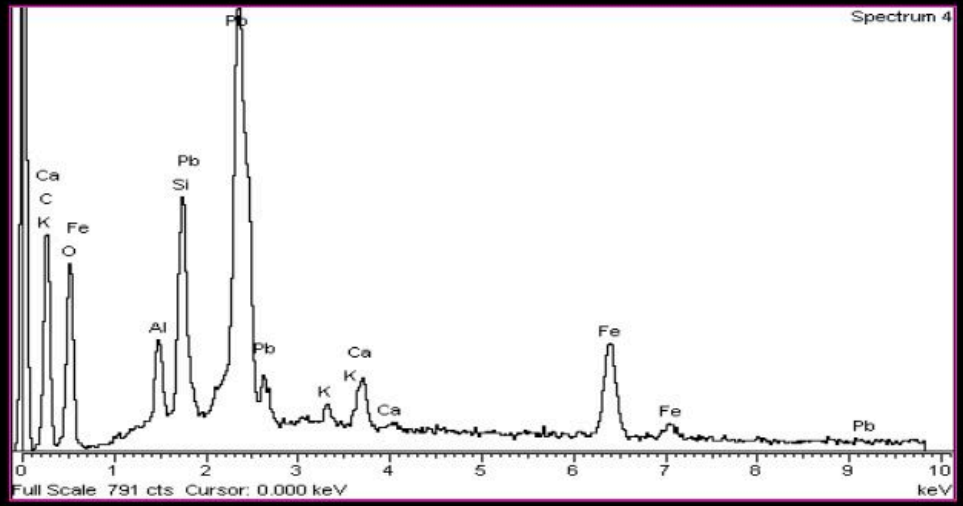


Sample 1 – Cross section, SEM back scattered electron image



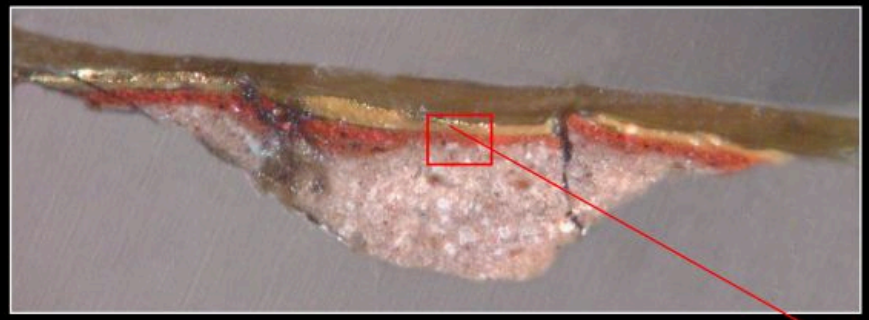
Sample 1 – Cross section, SEM. Area 4 microanalysis

In layer 5 of the cross section the presence of Pb is associated to Lead White ($2PbCO_3 \cdot (OH)_2$) and Al, Si, Fe to Earth pigments.

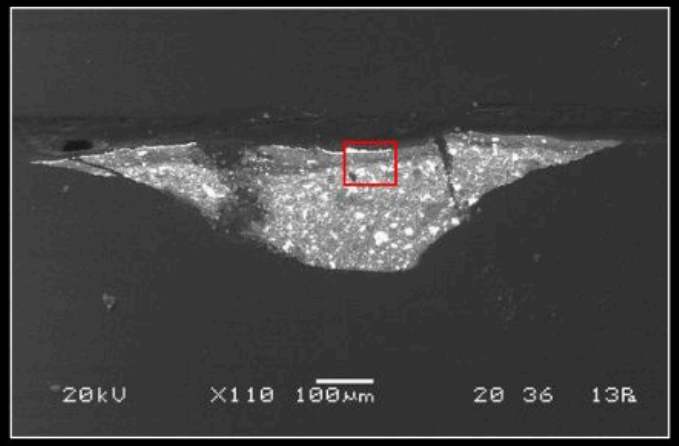


Sample 1 – Cross section, SEM – EDS. Area 4 microanalysis

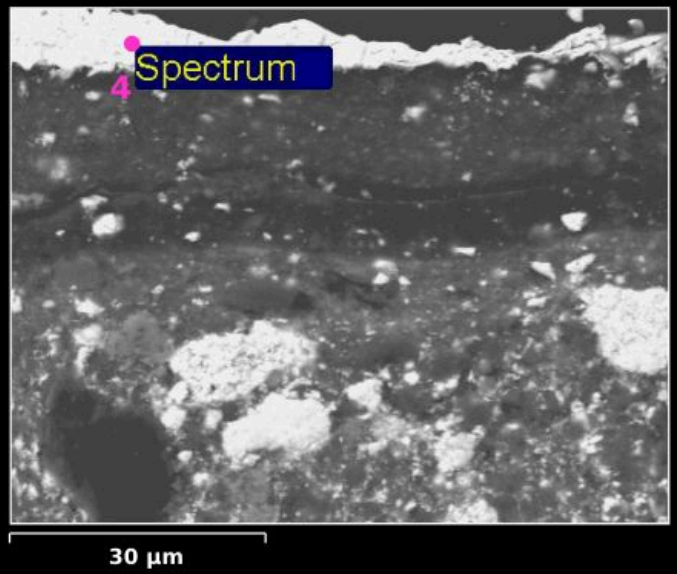
Joseph and Potifar's wife



Sample 1 – Cross section, Reflected Light

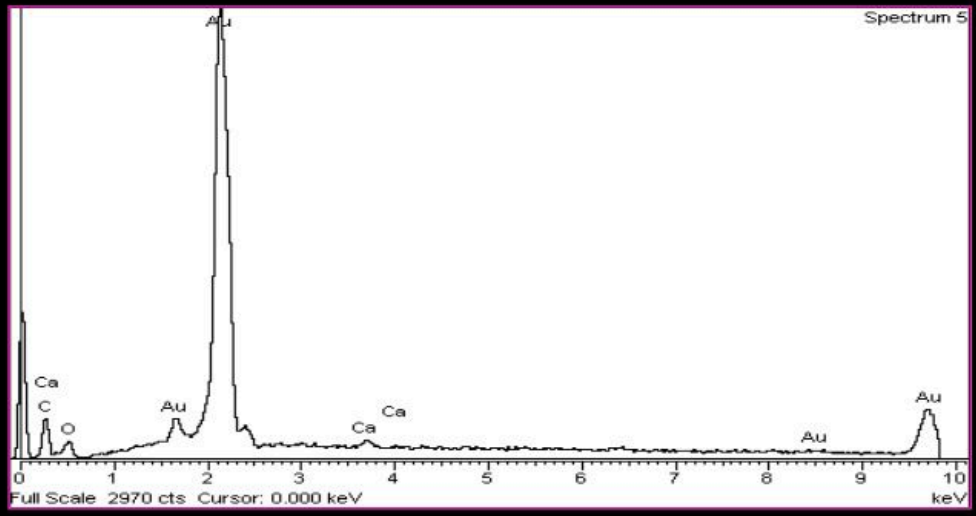


Sample 1 – Cross section, SEM back scattered electron image



Sample 1 – Cross section, SEM. Point 5 microanalysis

EDS microanalysis of Point 5 revealed the presence of Au related to Gold.



Sample 1 – Cross section, SEM – EDS. Point 5 microanalysis

Joseph and Potifar's wife

1 - Beige ground layer of Lead White, Calcite an some granules of Earth pigments.

2 - Red layer made of Lead White and Earth pigments.

3 - Red layer made of Lead White, Earth pigments and some some granules of Cinnabar.

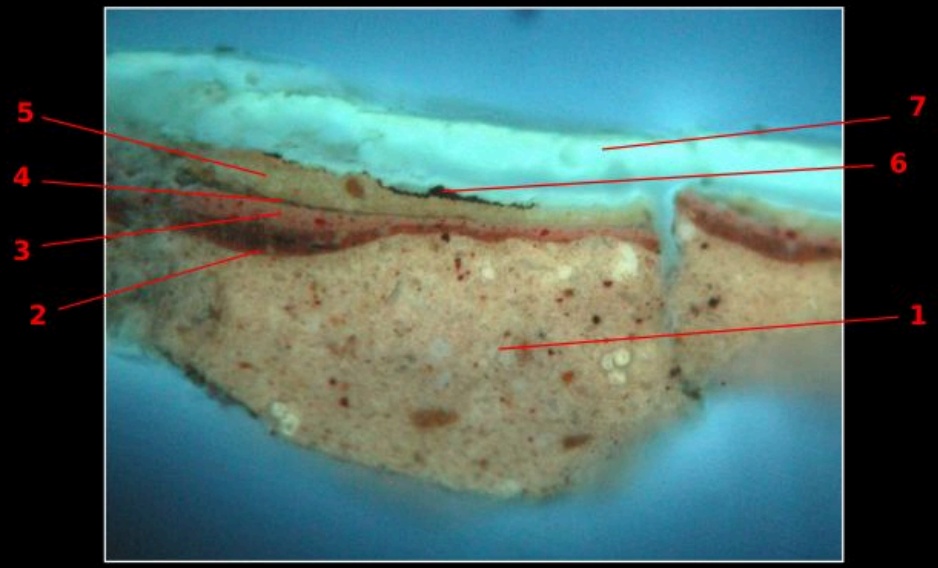
4 - Brown thin layer made mainly of organic material.

5 - Yellow layer of Lead White and Earth pigments

6 - Thin layer of Gold

7 - Several layers of varnish

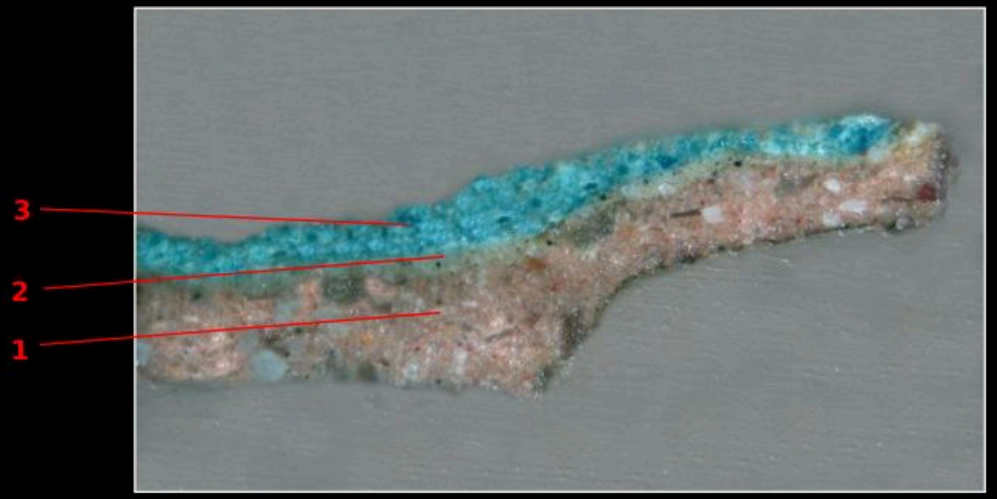
Sample 1 – Cross section, Reflected Light



Sample 1 – Cross section, UV Fluorescence

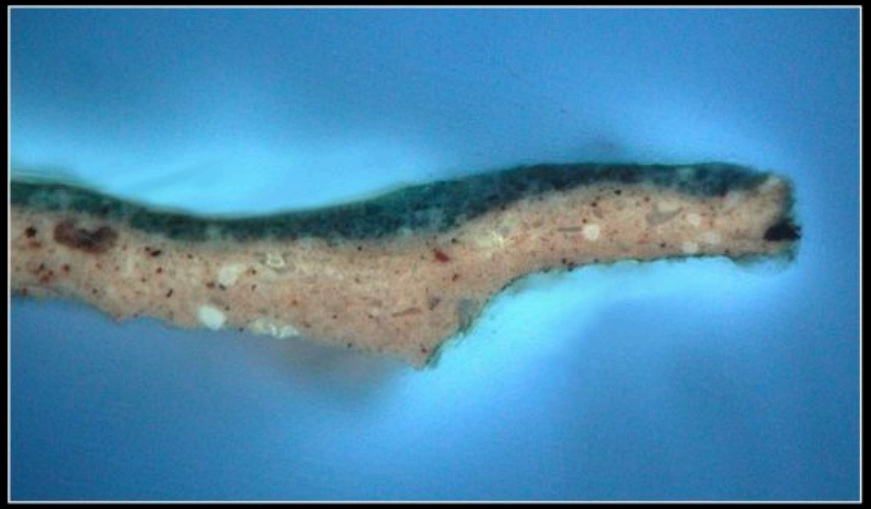
Joseph and Potifar's wife

Sample 2



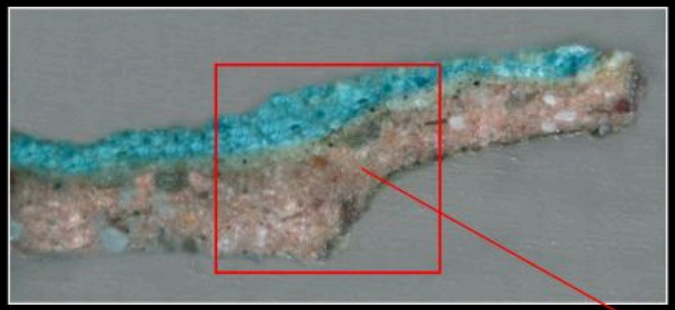
Sample 2 – Cross section, Reflected Light

Sample 2: detail

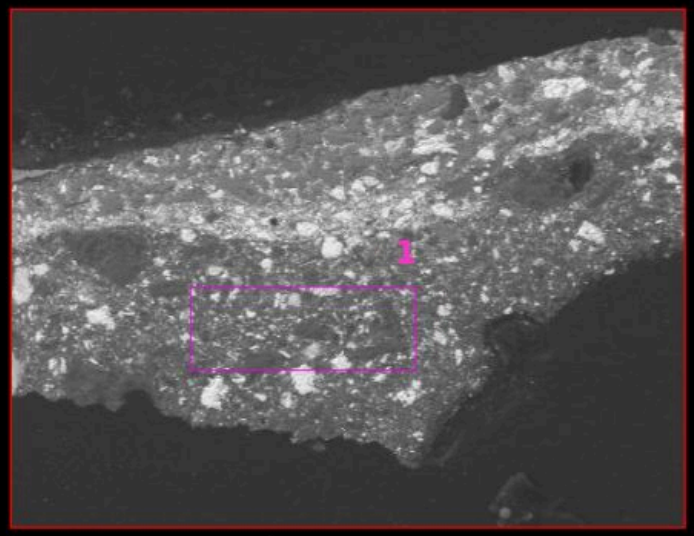


Sample 2 – Cross section, UV Fluorescence

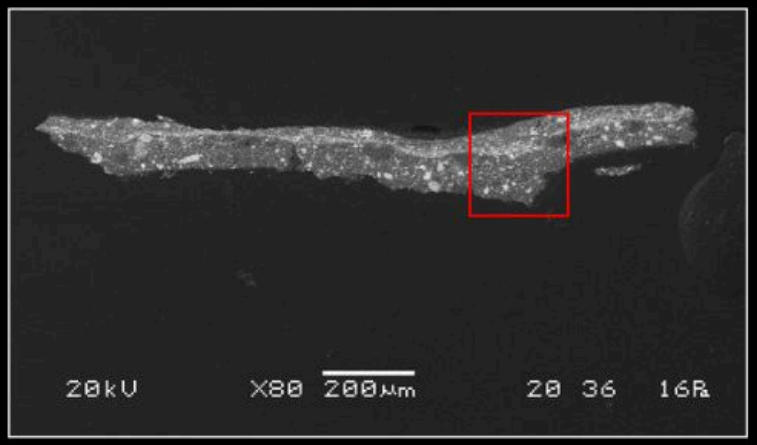
Joseph and Potifar's wife



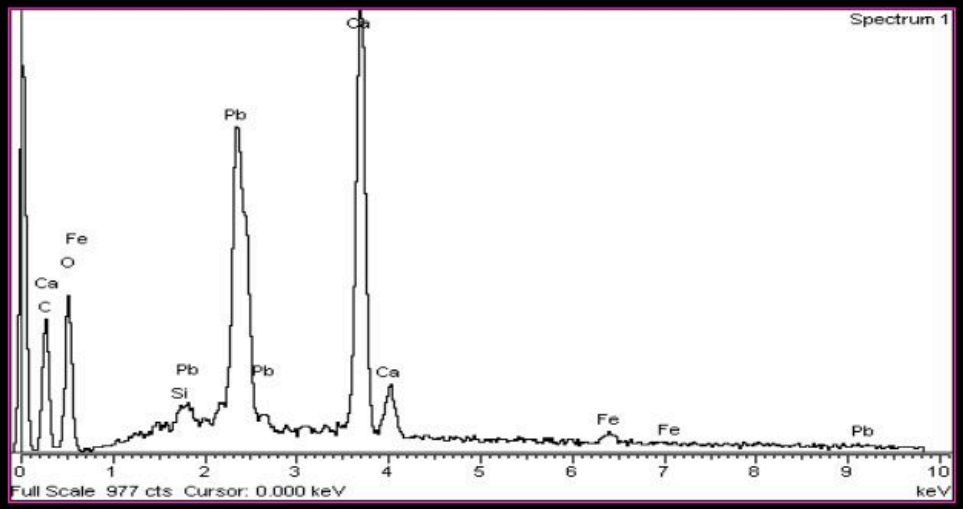
Sample 2 – Cross section, Reflected Light



Sample 2 – Cross section, SEM. Area 1 microanalysis



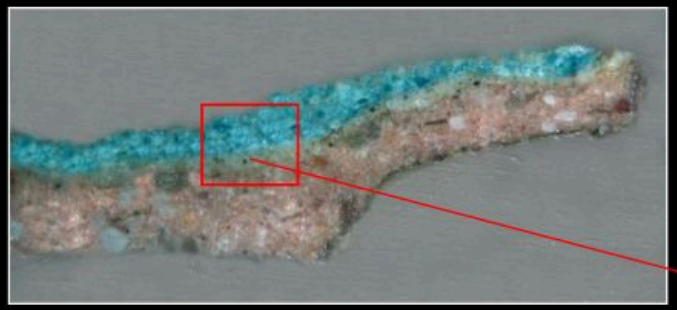
Sample 2 – Cross section, SEM back scattered electron image



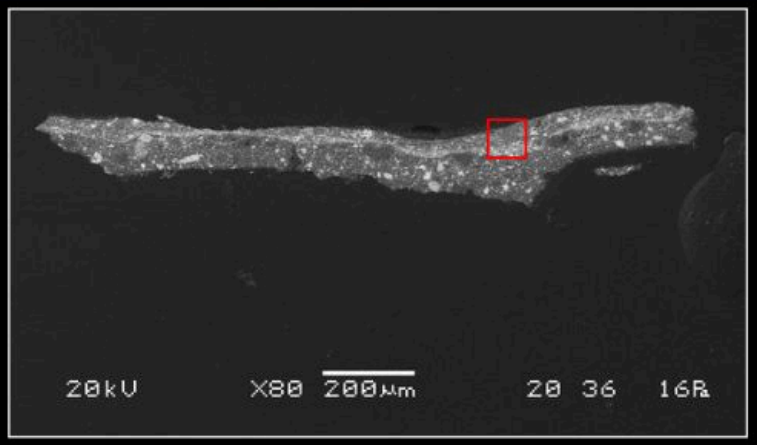
Sample 2 – Cross section, SEM – EDS. Area 1 microanalysis

Area 1: presence of Ca and Pb are associated to Calcite ($CaCO_3$) and Lead White ($2PbCO_3 \cdot (OH)_2$). Si and Fe are due to Earth pigments.

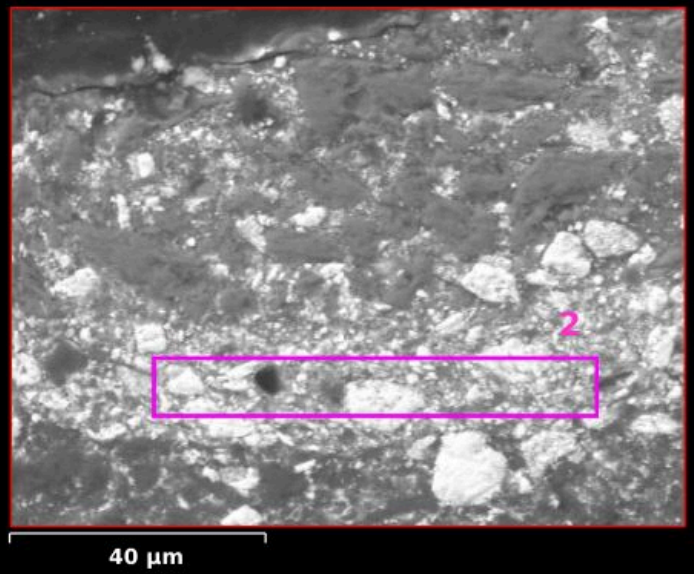
Joseph and Potifar's wife



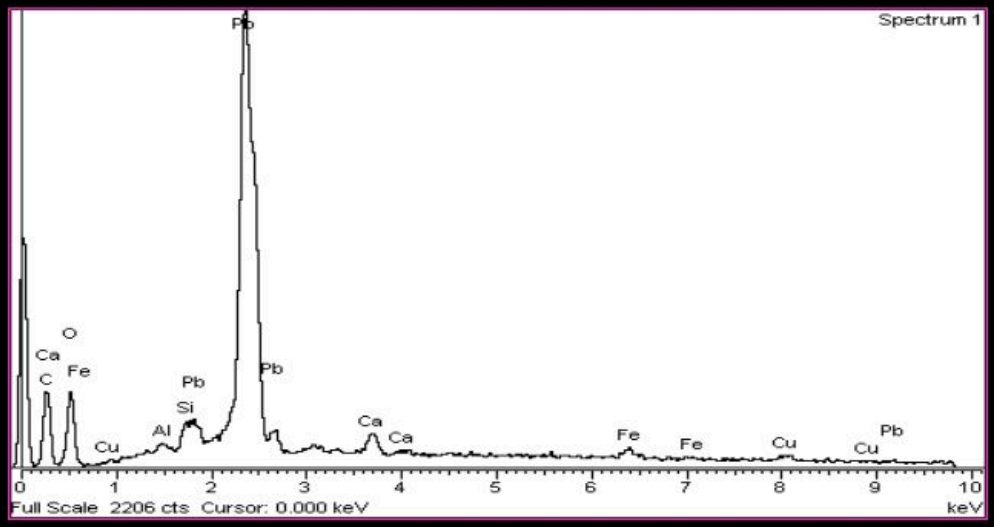
Sample 2 – Cross section, Reflected Light



Sample 2 – Cross section, SEM back scattered electron image



Sample 2 – Cross section, SEM. Area 2 microanalysis



Sample 2 – Cross section, SEM – EDS. Area 2 microanalysis

In layer 2 of the cross-section the presence of Pb is associated to Lead White. Ca is due to Calcite and Si, Al, Fe to Earth pigments.

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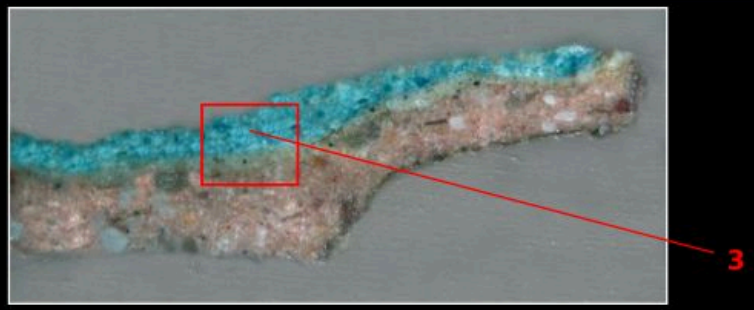
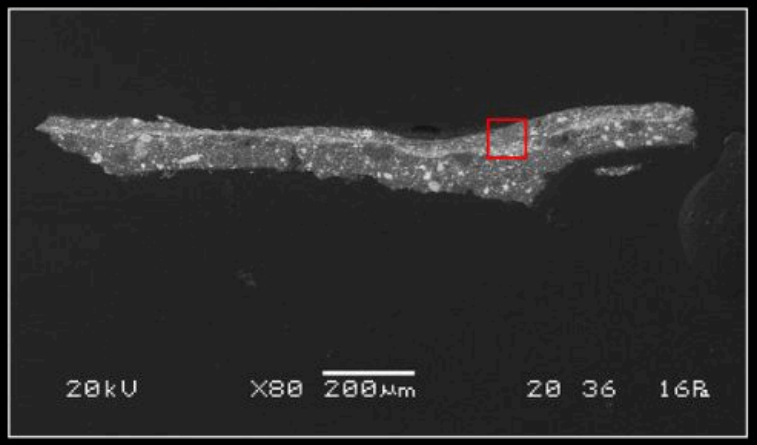
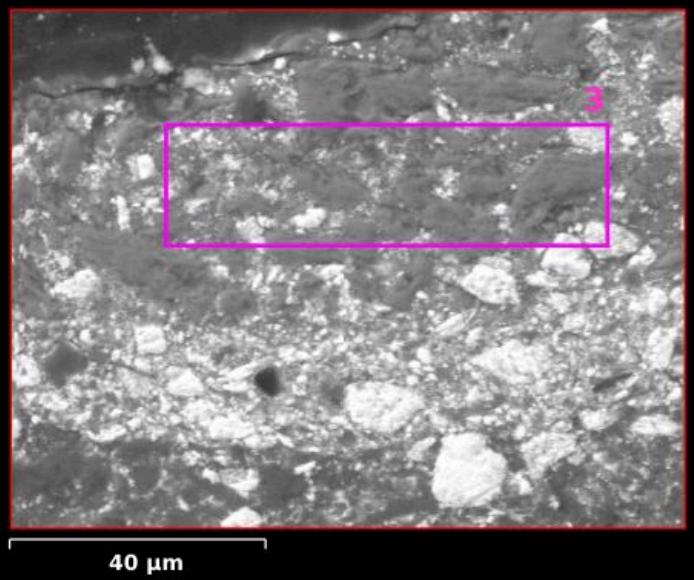


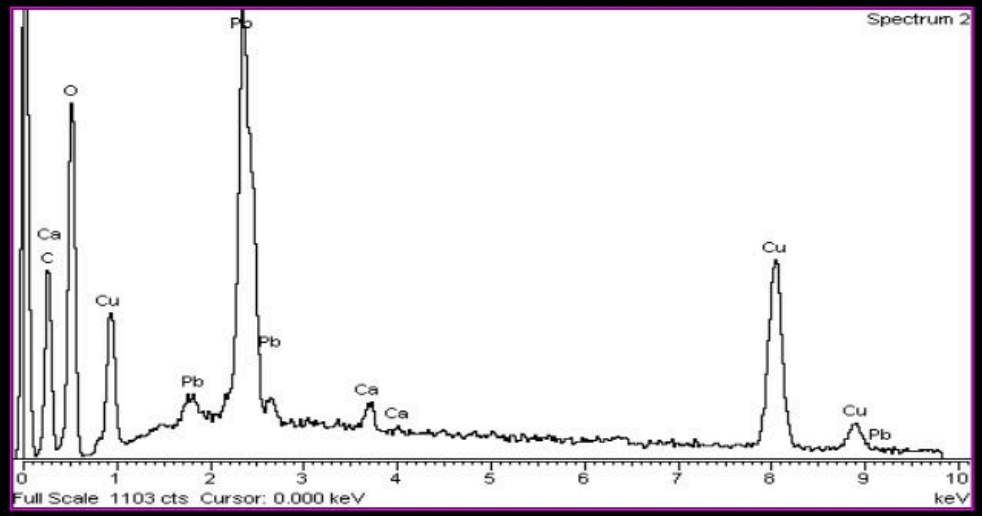
Sample 2 – Cross section, Reflected Light



Sample 2 – Cross section, SEM back scattered electron image



Sample 2 – Cross section, SEM. Area 3 microanalysis



Sample 2 – Cross section, SEM – EDS. Area 3 microanalysis

Area 3: the presence of Pb is due to Lead White ($2PbCO_3 \bullet (OH)_2$) and Cu to Azurite ($2CuCO_3 \bullet Cu(OH)_2$).

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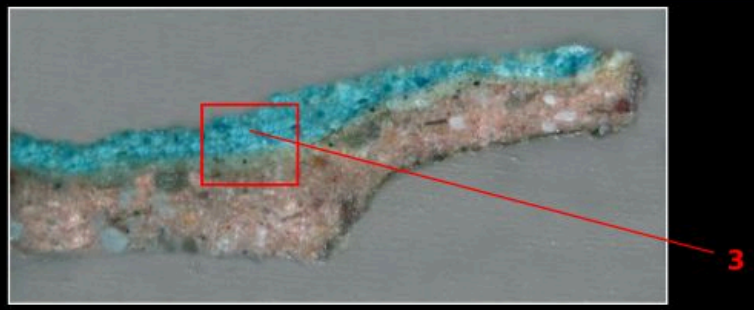
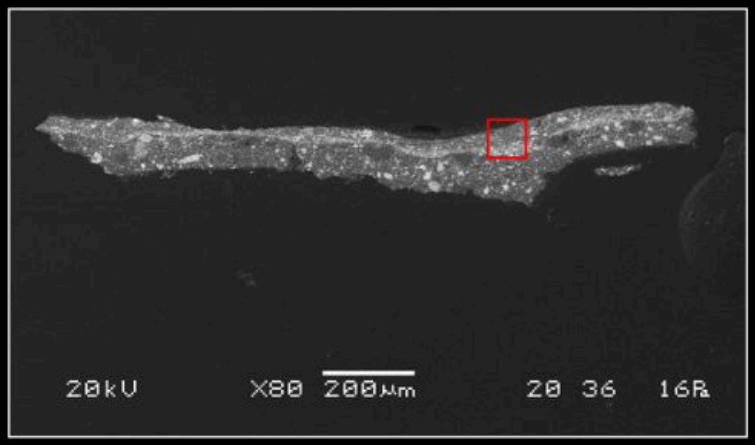


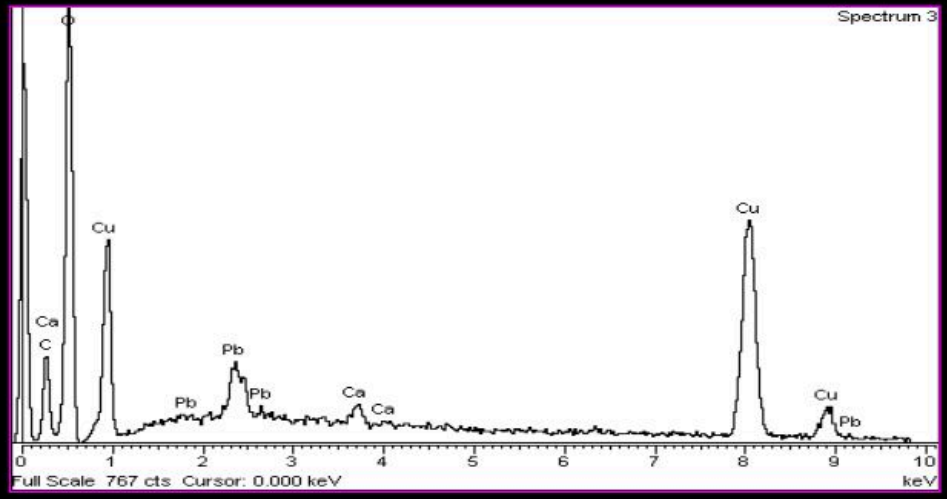
Sample 2 – Cross section, Reflected Light



Sample 2 – Cross section, SEM back scattered electron image

Sample 2 – Cross section, SEM. Point 1 microanalysis

EDS microanalysis of Point 1 confirms the presence of Cu related to Azurite ($2CuCO_3 \cdot Cu(OH)_2$.

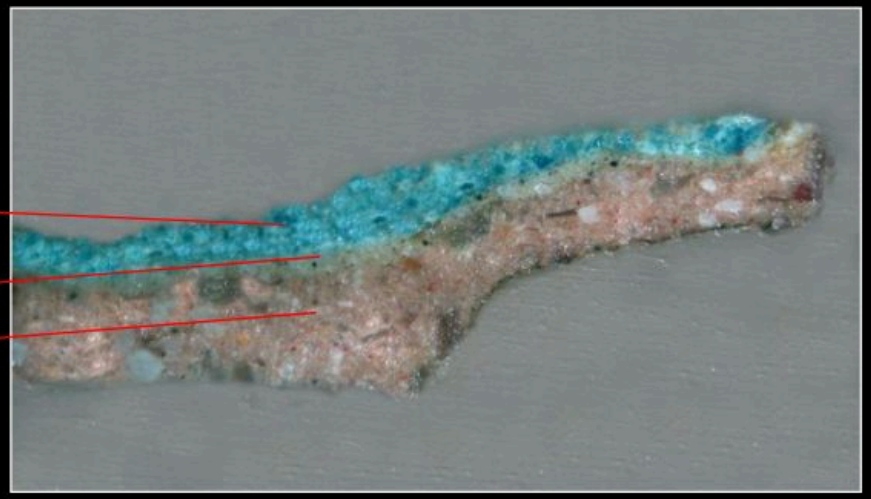


Sample 2 – Cross section, SEM – EDS. Point 1 microanalysis

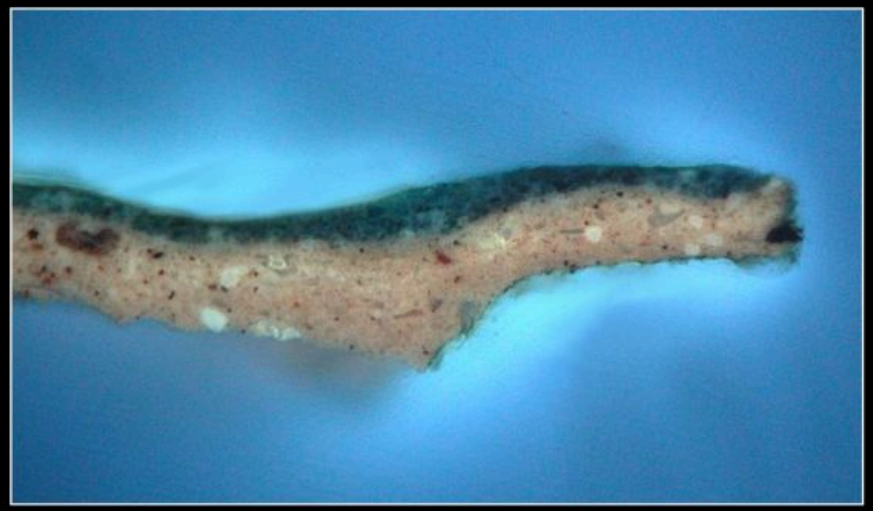
1 - Beige ground layer of Lead White, Calcite an some granules of Earth pigments.

2 - Light beige thin layer made of Lead White and few particles of Calcite and Earth pigments.

3 - Light blue layer of Lead White and Azurite



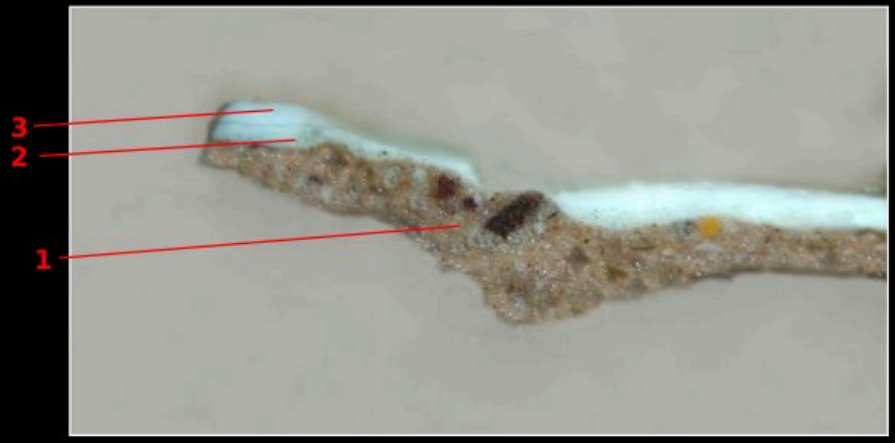
Sample 2 – Cross section, Reflected Light



Sample 2 – Cross section, UV Fluorescence

Joseph and Potifar's wife

Sample 3



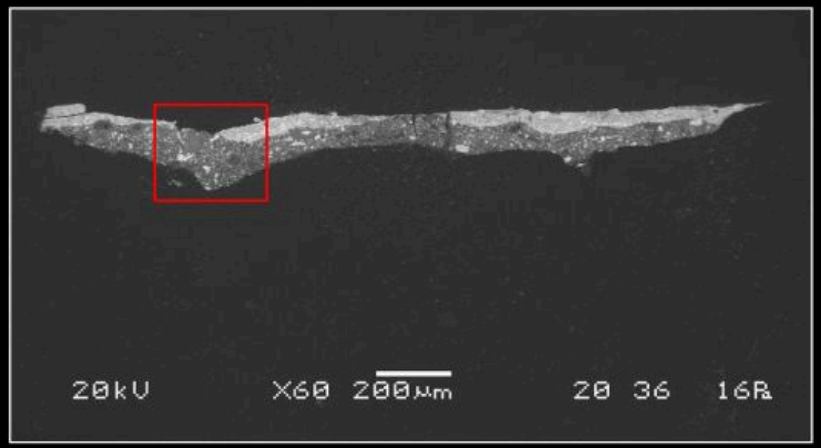
Sample 3 – Cross section, Reflected Light

Sample 3: detail

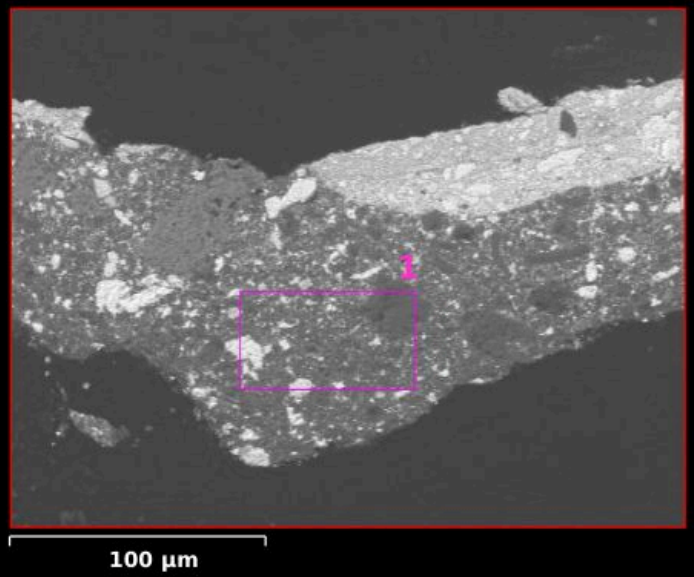
Sample 3 – Cross section, UV Fluorescence

Joseph and Potifar's wife

Sample 3 – Cross section, Reflected Light

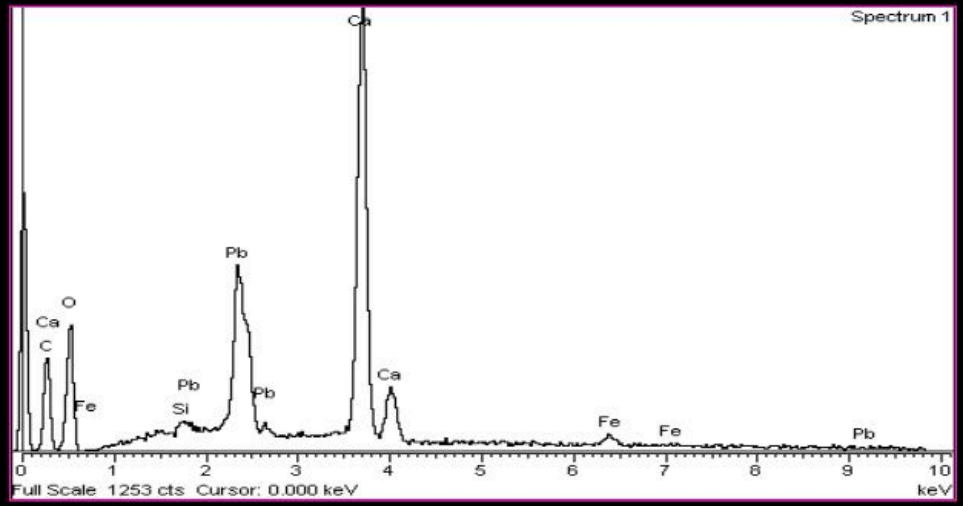


Sample 3 – Cross section, SEM back scattered electron image



Sample 3 – Cross section, SEM. Area 1 microanalysis

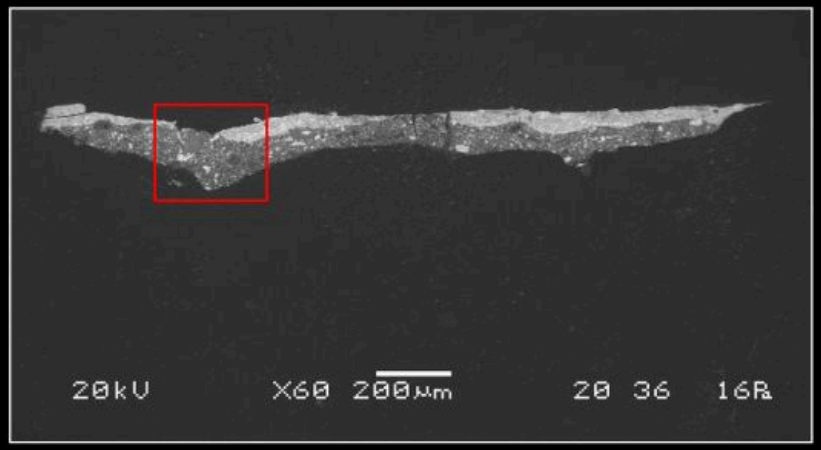
Area 1: presence of Ca and Pb are associated to Calcite ($CaCO_3$) and Lead White ($2PbCO_3 \cdot (OH)_2$). Si and Fe are due to Earth pigments.



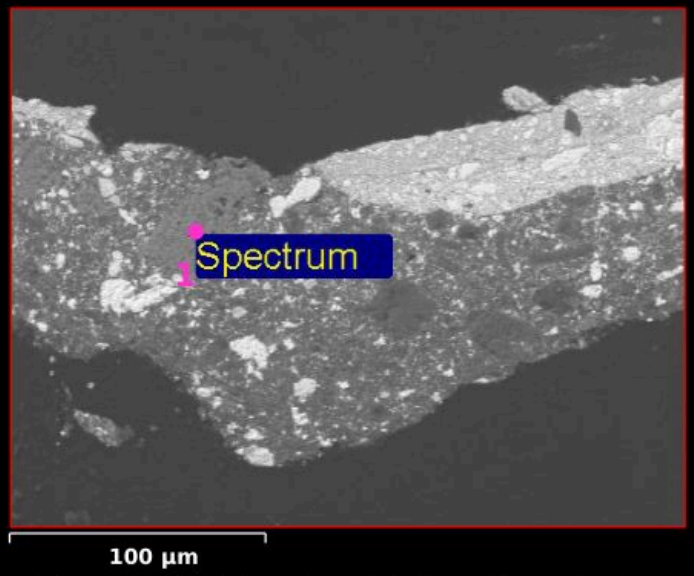
Sample 3 – Cross section, SEM – EDS. Area 1 microanalysis

Joseph and Potifar's wife

Sample 3 – Cross section, Reflected Light

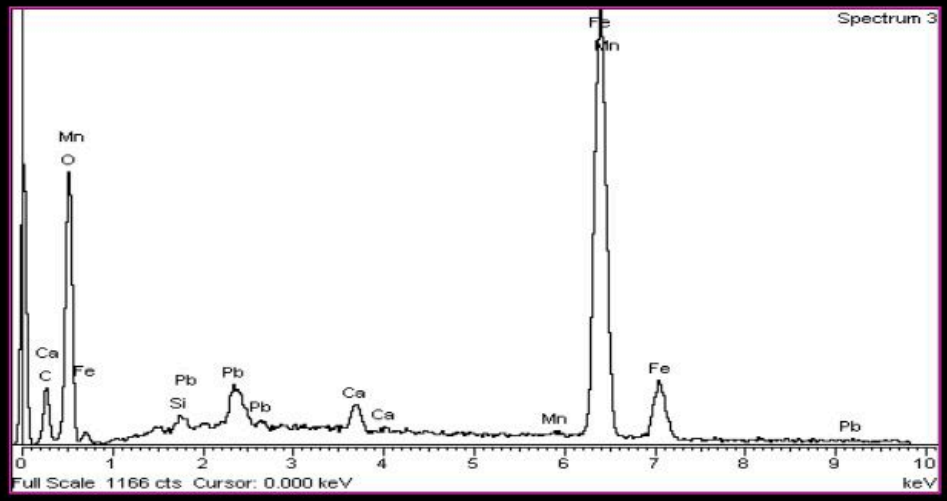


Sample 3 – Cross section, SEM back scattered electron image



Sample 3 – Cross section, SEM. Point 1 microanalysis

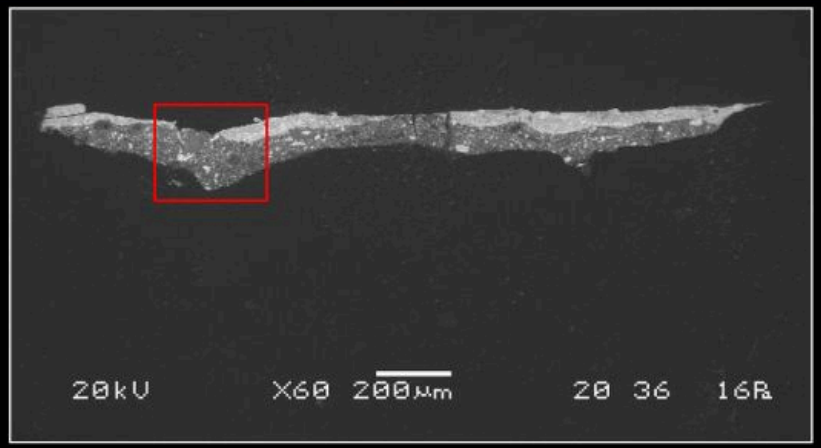
The presence of Fe is associated to a big granules of Earth pigments.



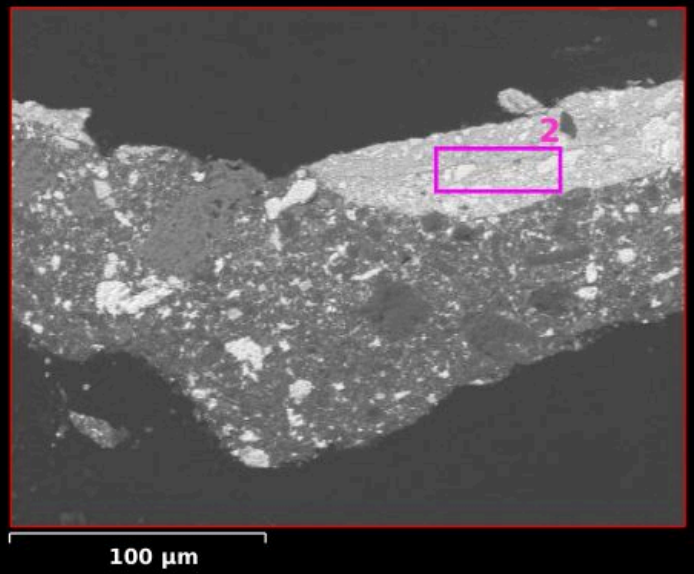
Sample 3 – Cross section, SEM – EDS. Point 1 microanalysis

Joseph and Potifar's wife

Sample 3 – Cross section, Reflected Light

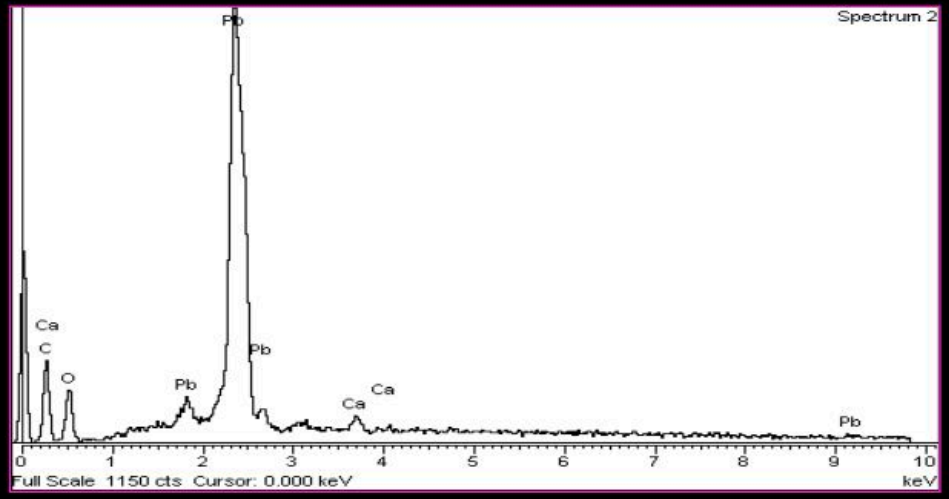


Sample 3 – Cross section, SEM back scattered electron image



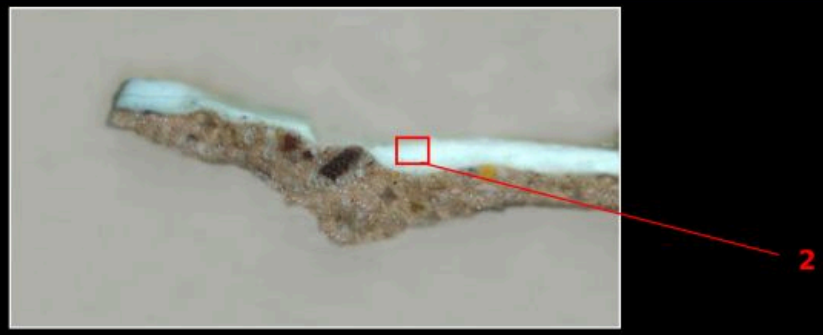
Sample 3 – Cross section, SEM. Area 2 microanalysis

EDS microanalysis of Area 2 revealed the presence of Pb, related to Lead White ($2PbCO_3 \bullet (OH)_2$).

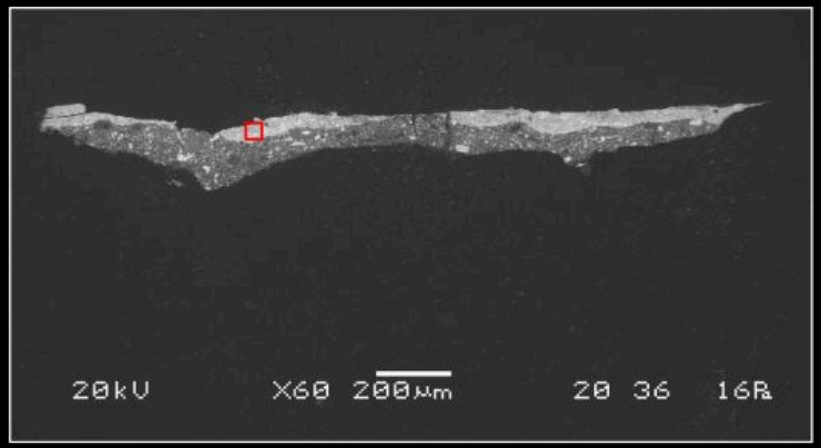


Sample 3 – Cross section, SEM – EDS. Area 2 microanalysis

Joseph and Potifar's wife



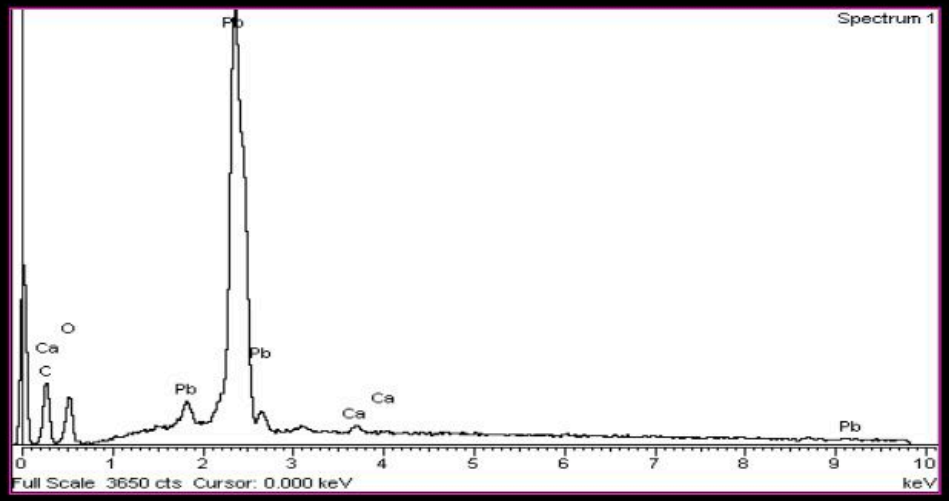
Sample 3 – Cross section, Reflected Light



Sample 3 – Cross section, SEM back scattered electron image

Sample 3 – Cross section, SEM. Area 3 microanalysis

The presence of Pb is due to Lead White ($2PbCO_3 \cdot (OH)_2$).



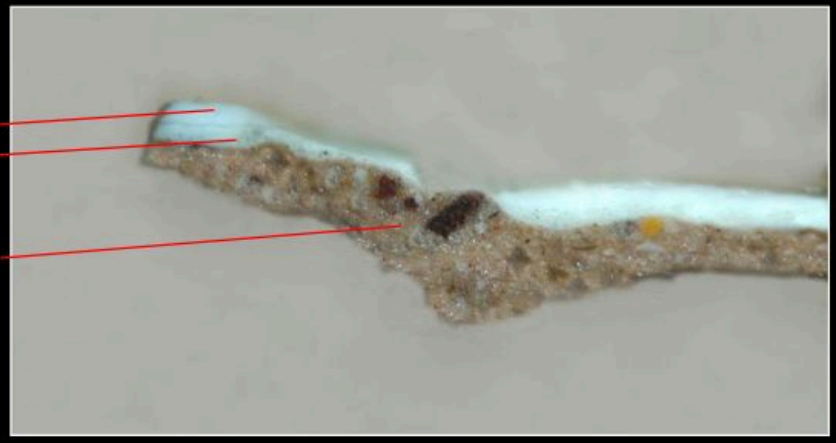
Sample 3 – Cross section, SEM – EDS. Area 3 microanalysis

1 - Beige ground layer of Lead White, Calcite an some granules of Earth pigments.

2 - White layer made of Lead White and some particles of Carbon Black.

3 - White layer of Lead White.

4 - Layer of varnish.

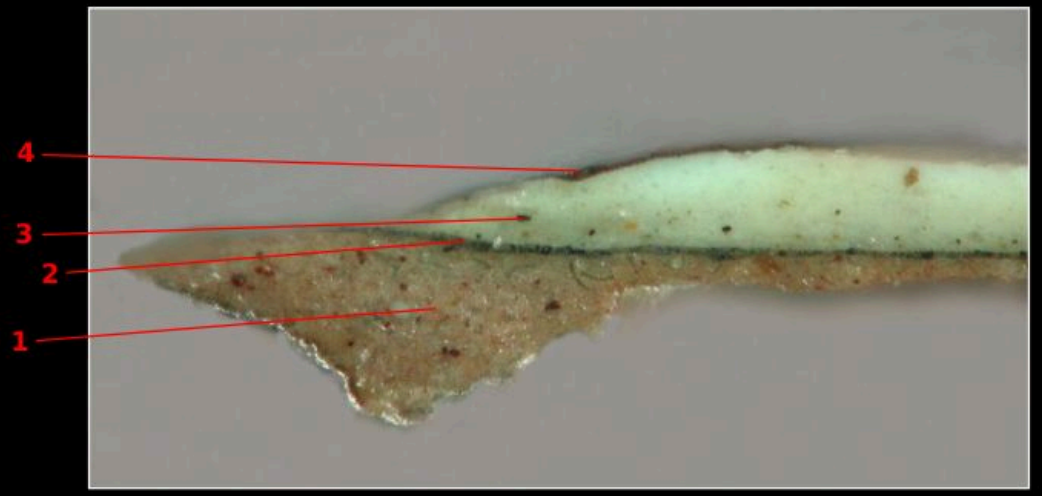


Sample 3 – Cross section, Reflected Light

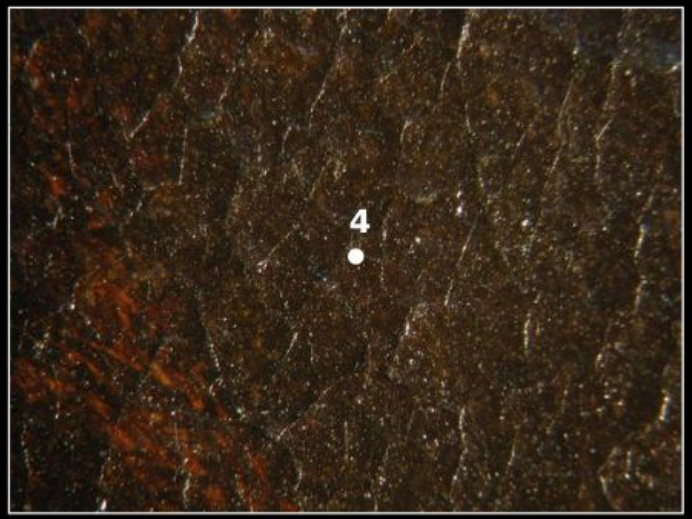
Sample 3 – Cross section, UV Fluorescence

Joseph and Potifar's wife

Sample 4



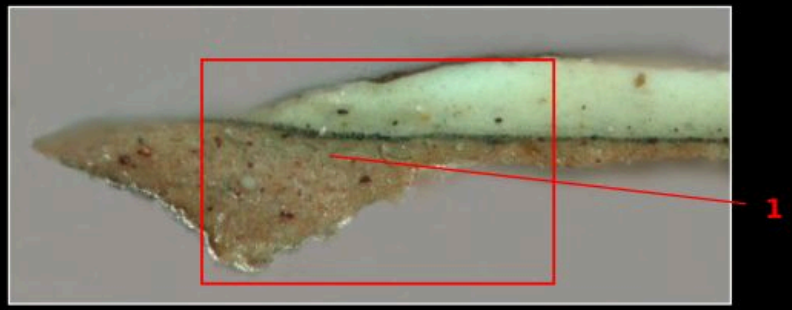
Sample 4 – Cross section, Reflected Light



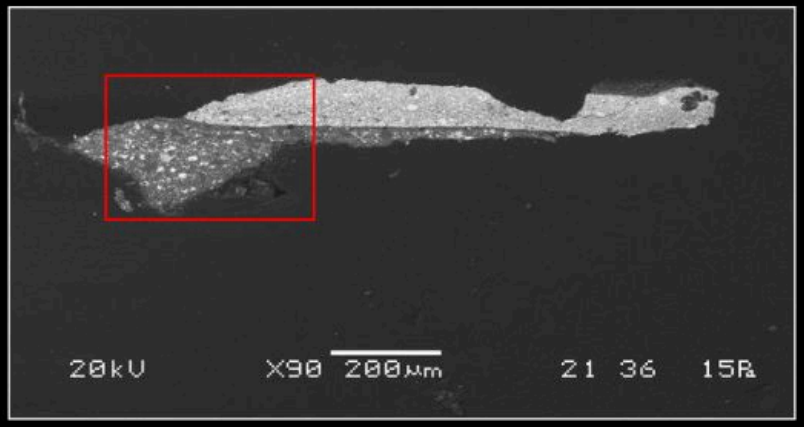
Sample 4: detail

Sample 4 – Cross section, UV Fluorescence

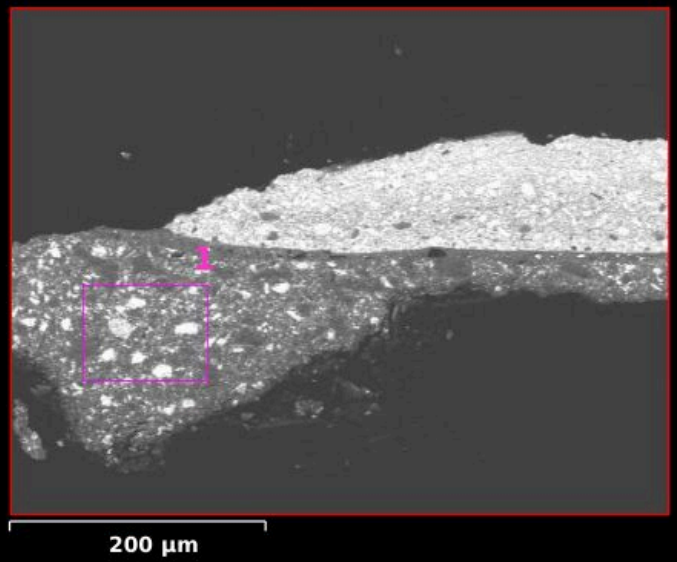
Joseph and Potifar's wife



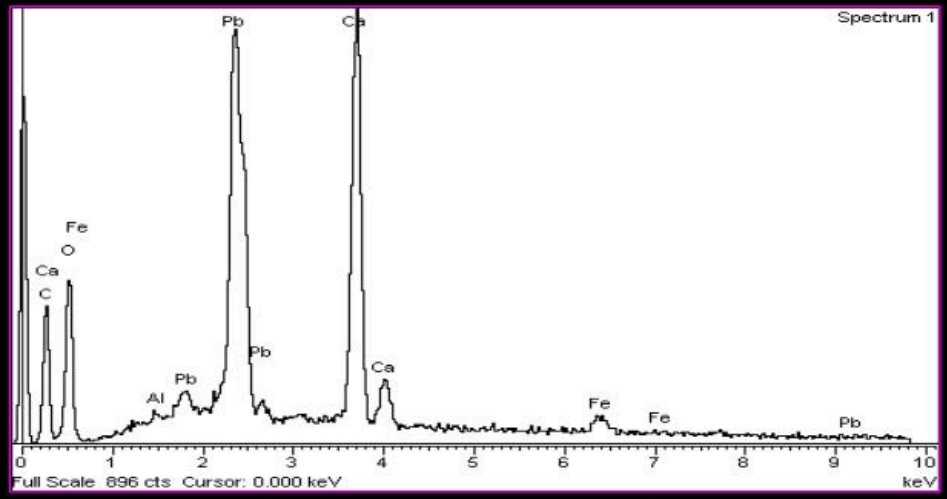
Sample 4 – Cross section, Reflected Light



Sample 4 – Cross section, SEM back scattered electron image



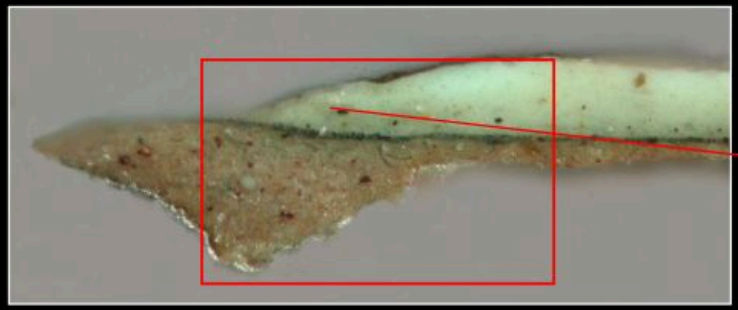
Sample 4 – Cross section, SEM. Area 1 microanalysis



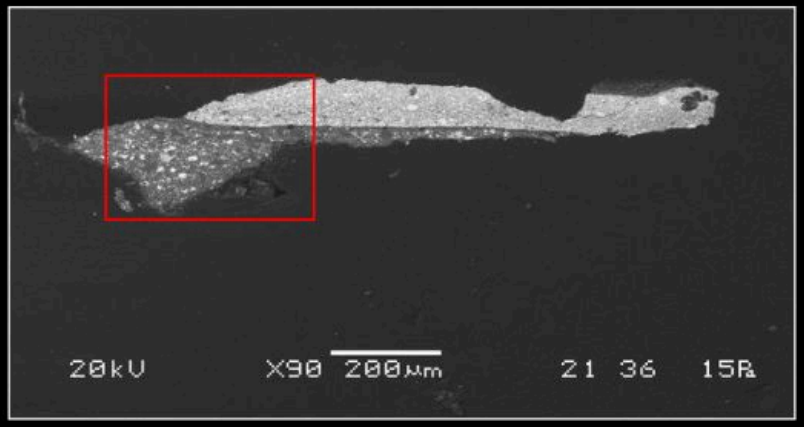
Sample 4 – Cross section, SEM – EDS. Area 1 microanalysis

Area 1: presence of Ca and Pb are associated to Calcite ($CaCO_3$) and Lead White ($2PbCO_3 \cdot (OH)_2$). Si and Fe are due to Earth pigments.

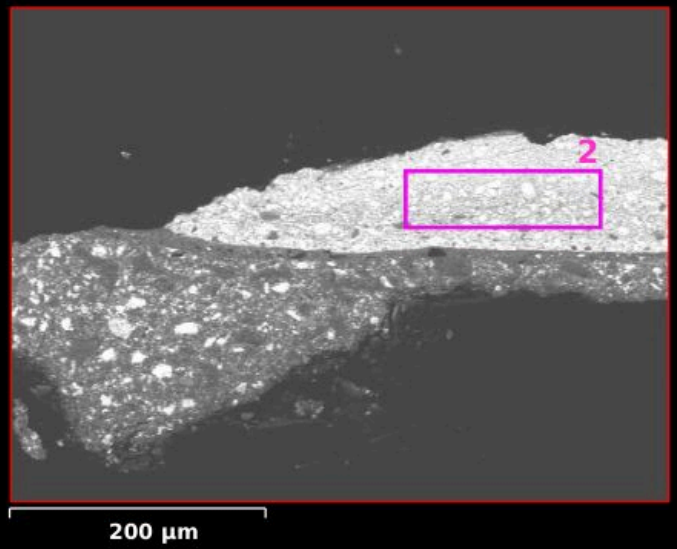
Joseph and Potifar's wife



Sample 4 – Cross section, Reflected Light

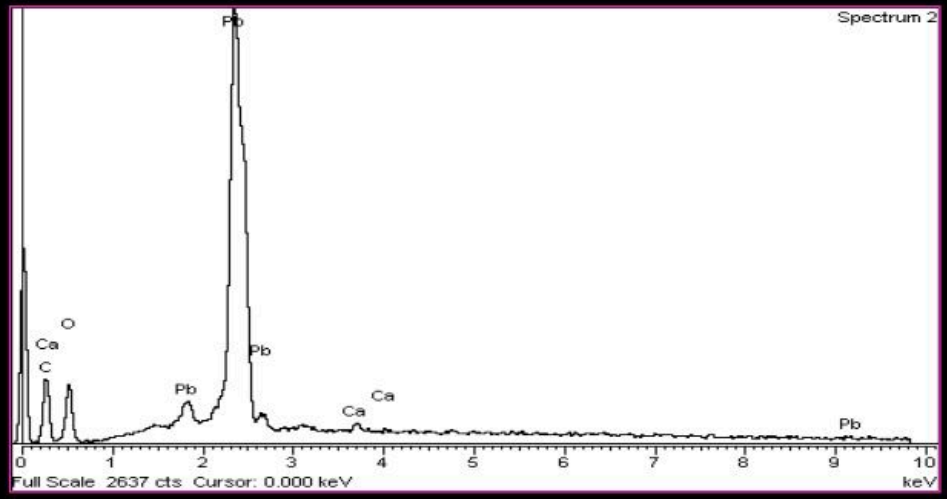


Sample 4 – Cross section, SEM back scattered electron image



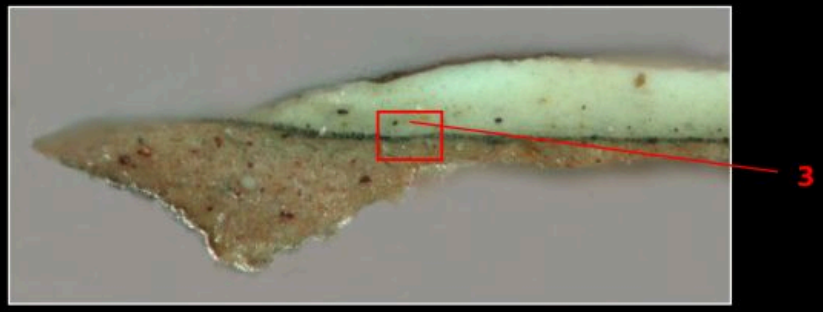
Sample 4 – Cross section, SEM. Area 2 microanalysis

In layer 3 of the cross-section the presence of Pb is associated to Lead White ($2PbCO_3 \cdot (OH)_2$).

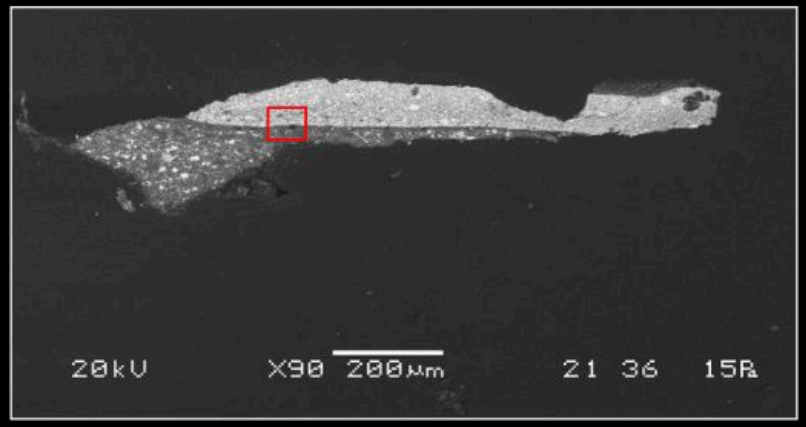


Sample 4 – Cross section, SEM – EDS. Area 2 microanalysis

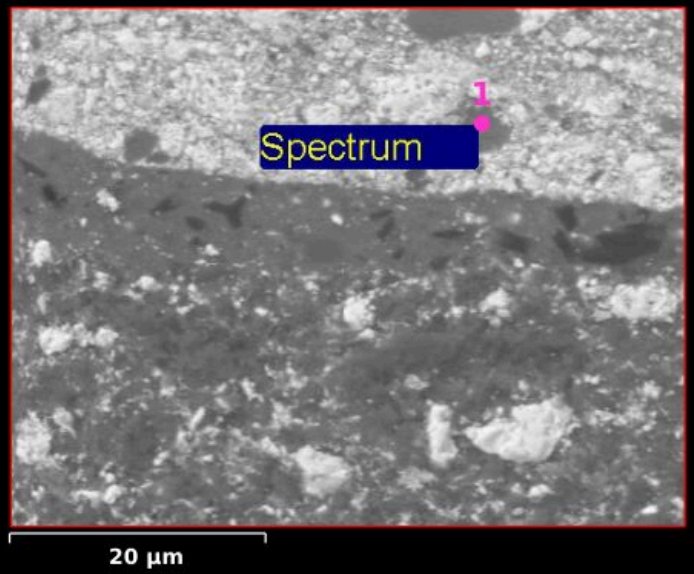
Joseph and Potifar's wife



Sample 4 – Cross section, Reflected Light

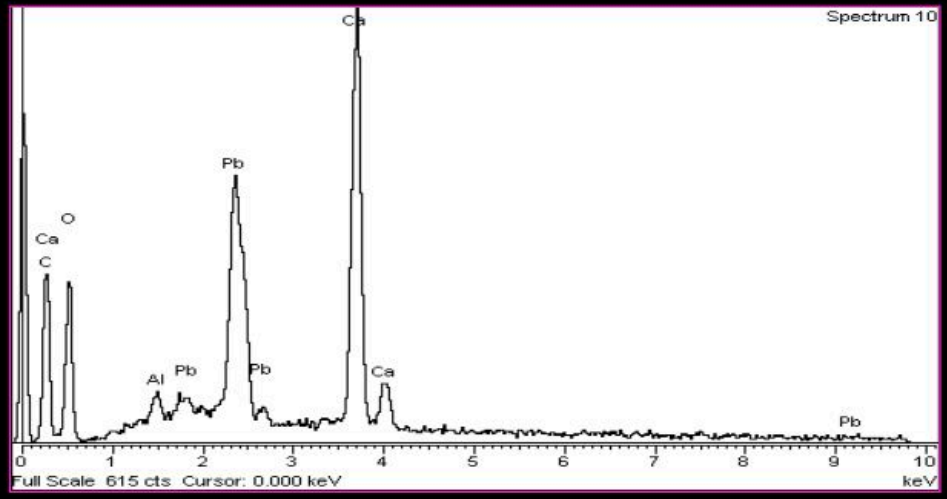


Sample 4 – Cross section, SEM back scattered electron image



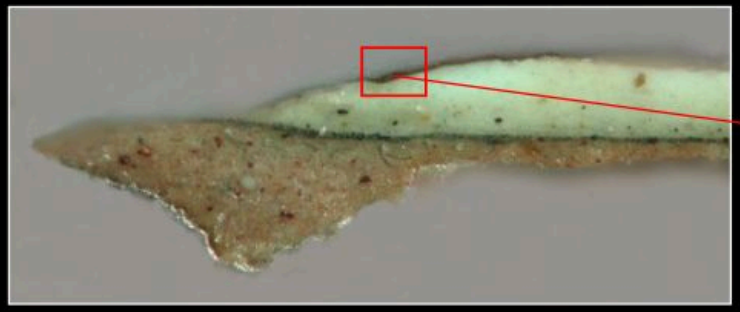
Sample 4 – Cross section, SEM. Point 1 microanalysis

The high peak of Ca is due to Calcite ($CaCO_3$) .

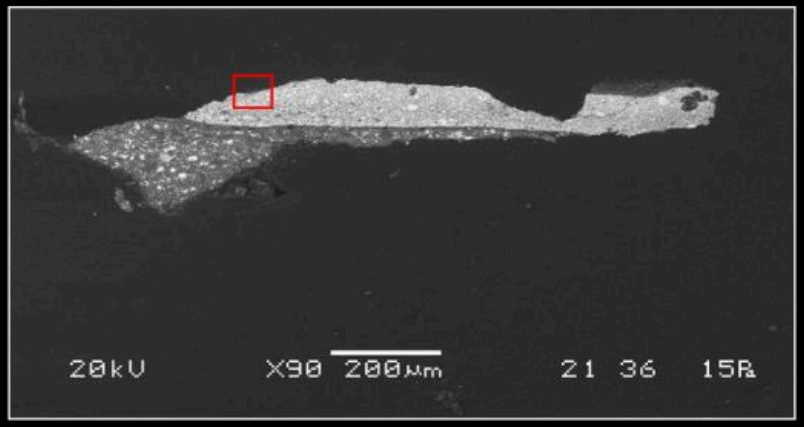


Sample 4 – Cross section, SEM – EDS. Point 1 microanalysis

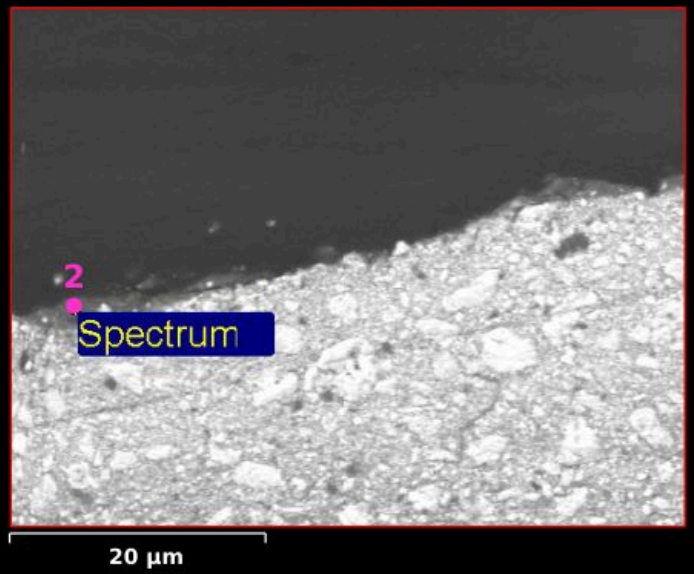
Joseph and Potifar's wife



Sample 4 – Cross section, Reflected Light

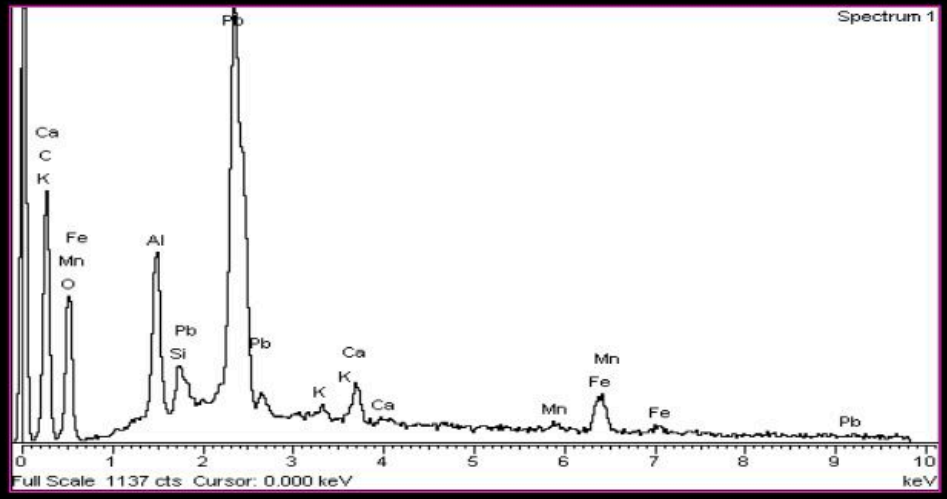


Sample 4 – Cross section, SEM back scattered electron image



Sample 4 – Cross section, SEM. Point 2 microanalysis

Il layer 4 the presence of Al, Si, Fe and Mn is due to Earth pigments.



Sample 4 – Cross section, SEM – EDS. Point 2 microanalysis

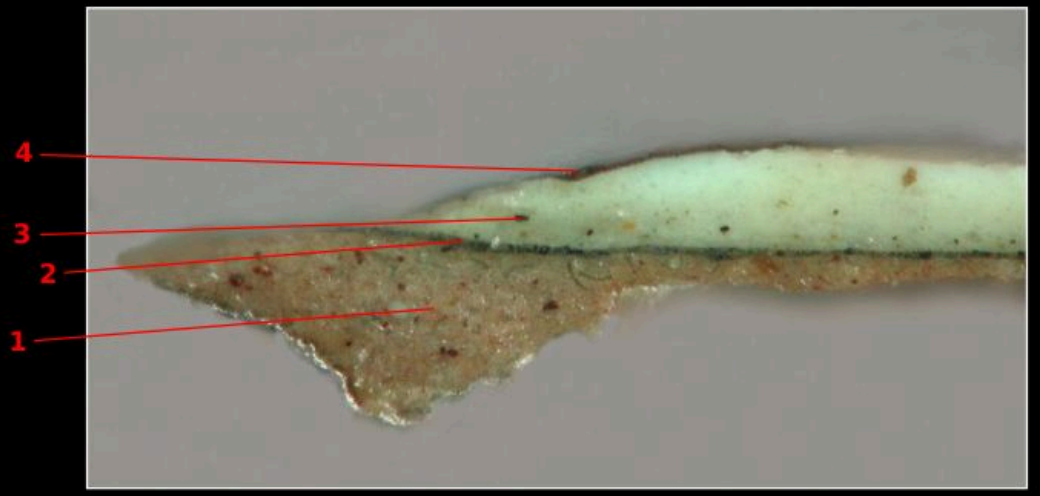
Joseph and Potifar's wife

1 - Beige ground layer of Lead White, Calcite an some granules of Earth pigments.

2 - Dark thin layer made of Calcite and some granules of Carbon Black.

3 - White layer of Lead White and some granules of Calcite. Are also present some particles of Carbon Black.

4 - Brownish thin layer of Earth pigments.

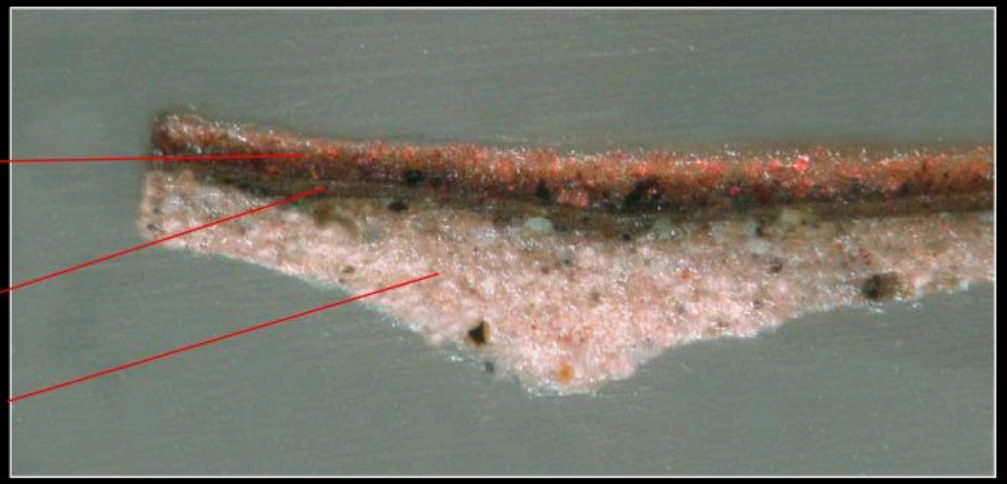


Sample 4 – Cross section, Reflected Light

Sample 4 – Cross section, UV Fluorescence

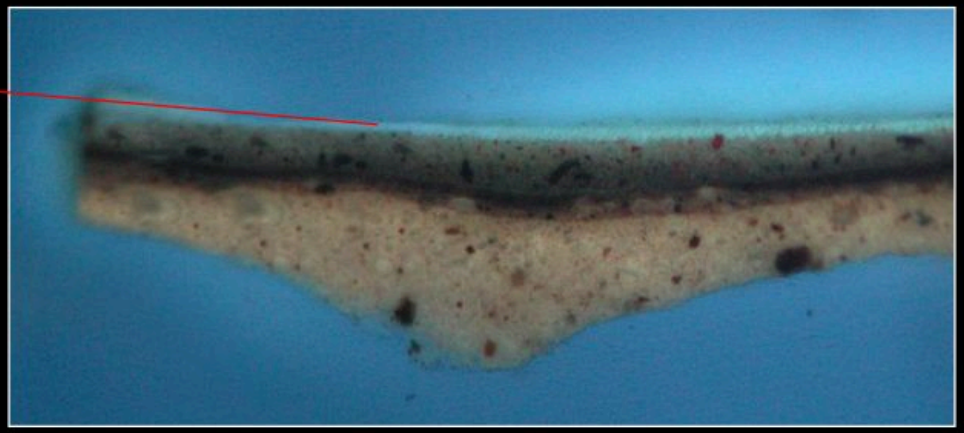
Joseph and Potifar's wife

Sample 6



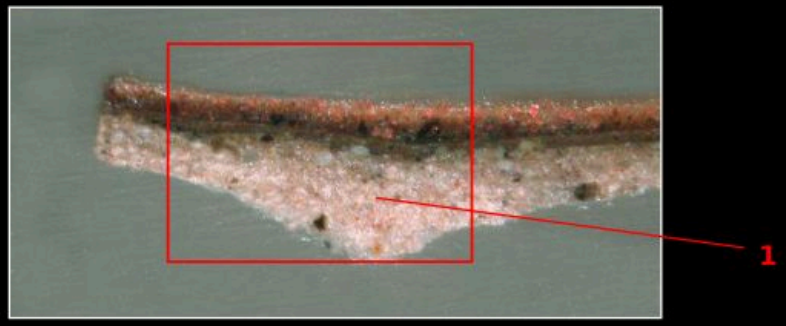
Sample 6 – Cross section, Reflected Light

Sample 6: detail

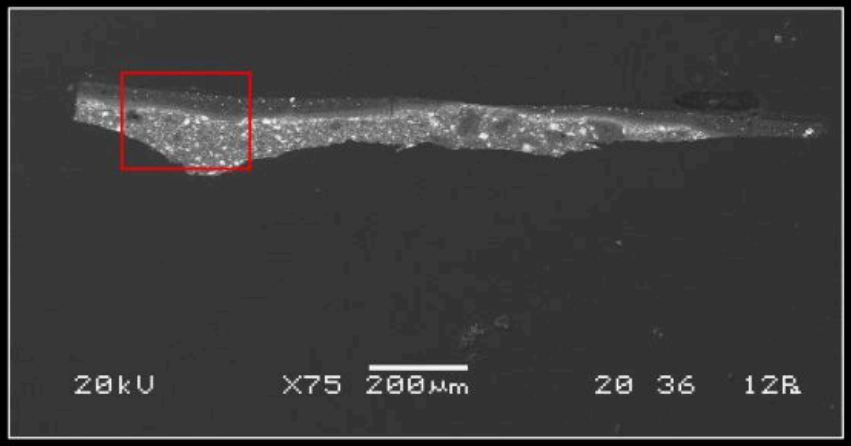


Sample 6 – Cross section, UV Fluorescence

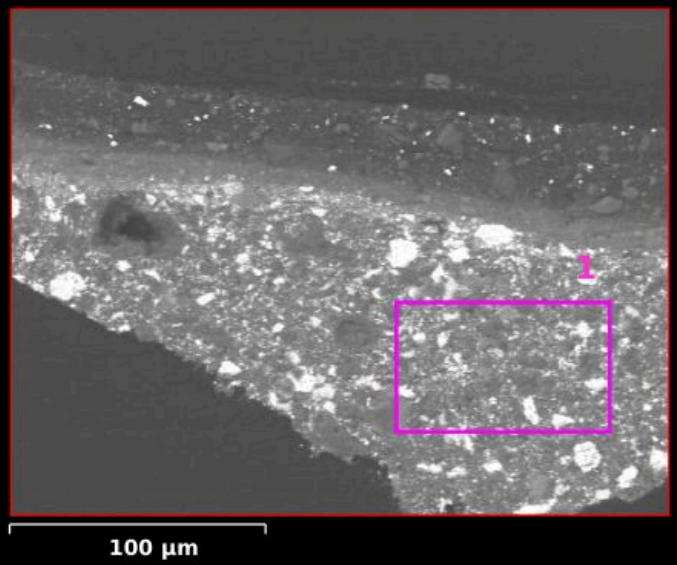
Joseph and Potifar's wife



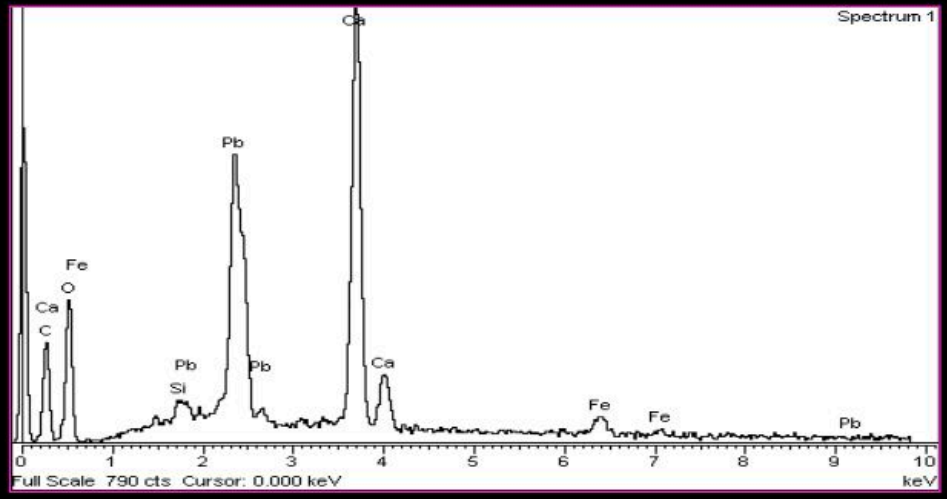
Sample 6 – Cross section, Reflected Light



Sample 6 – Cross section, SEM back scattered electron image



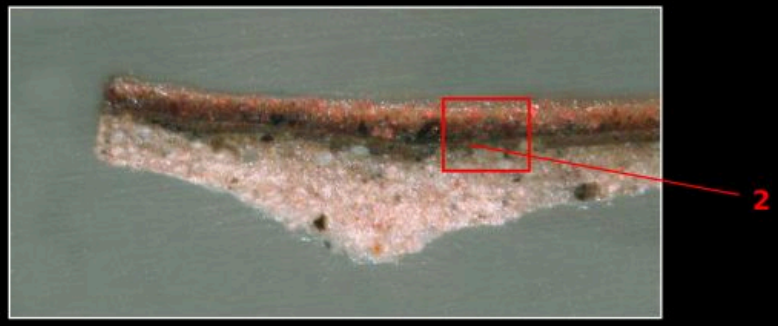
Sample 6 – Cross section, SEM. Area 1 microanalysis



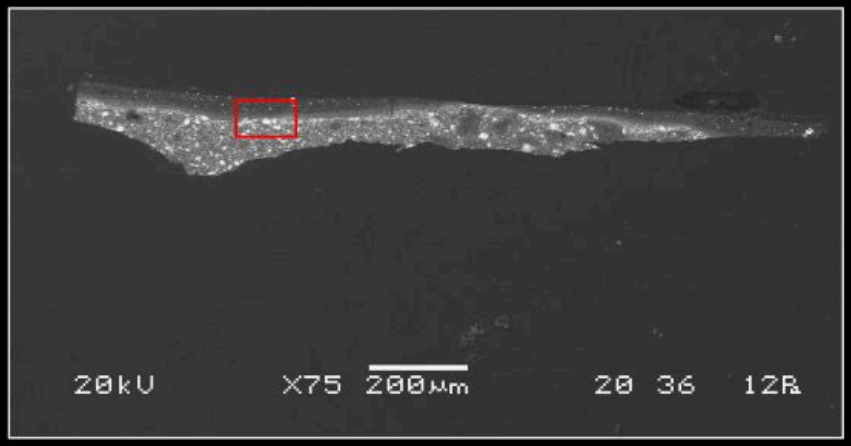
Sample 6 – Cross section, SEM – EDS. Area 1 microanalysis

Area 1: presence of Ca and Pb are associated to Calcite ($CaCO_3$) and Lead White ($2PbCO_3 \cdot (OH)_2$). Si and Fe are due to Earth pigments.

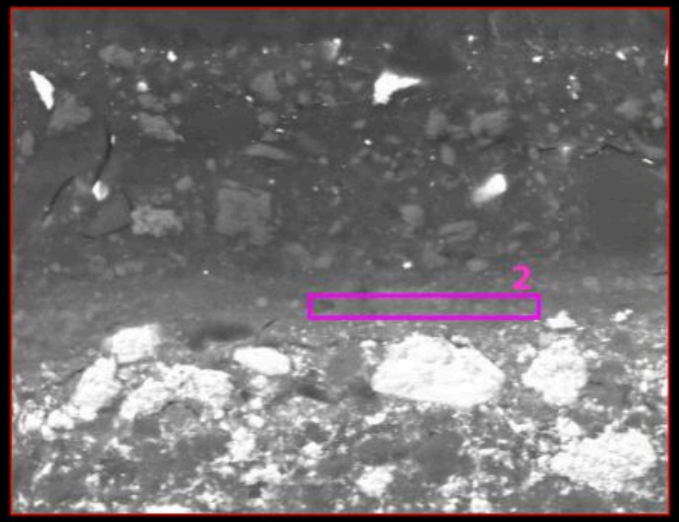
Joseph and Potifar's wife



Sample 6 – Cross section, Reflected Light

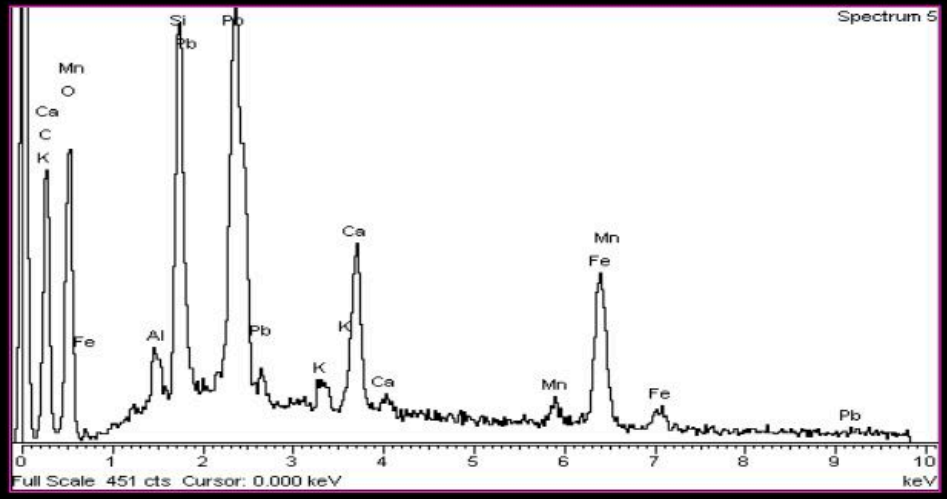


Sample 6 – Cross section, SEM back scattered electron image



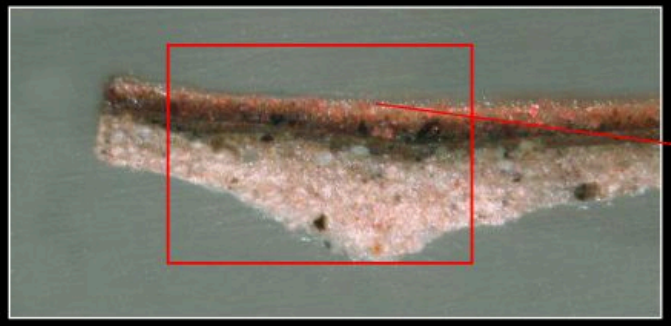
Sample 6 – Cross section, SEM. Area 2 microanalysis

EDS microanalysis of Area 2 revealed the presence of Al, Si and Fe related to Earth pigments, Ca to Calcite ($CaCO_3$) and Pb to Lead White ($2PbCO_3 \bullet (OH)_2$).

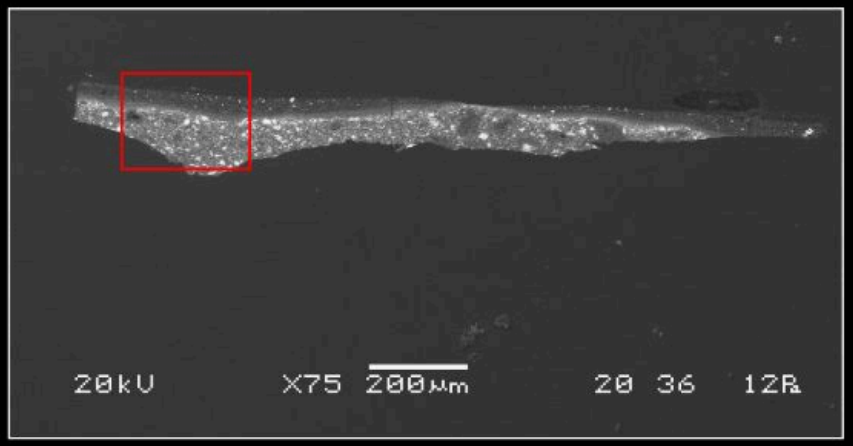


Sample 6 – Cross section, SEM – EDS. Area 2 microanalysis

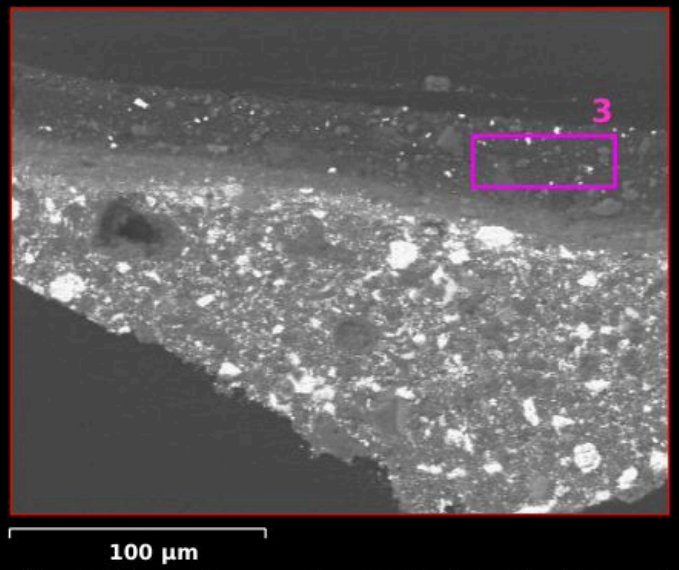
Joseph and Potifar's wife



Sample 6 – Cross section, Reflected Light

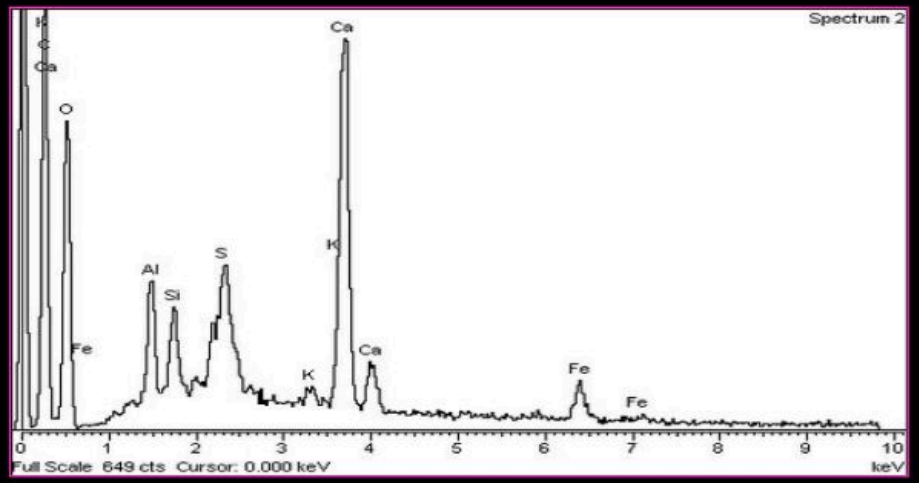


Sample 6 – Cross section, SEM back scattered electron image



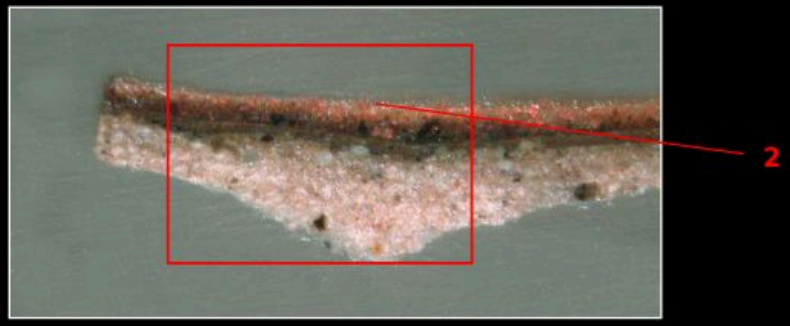
Sample 6 – Cross section, SEM. Area 3 microanalysis

In layer 3 the presence of Ca is due to Calcite ($CaCO_3$) and Al, Si, Fe to Earth pigments.

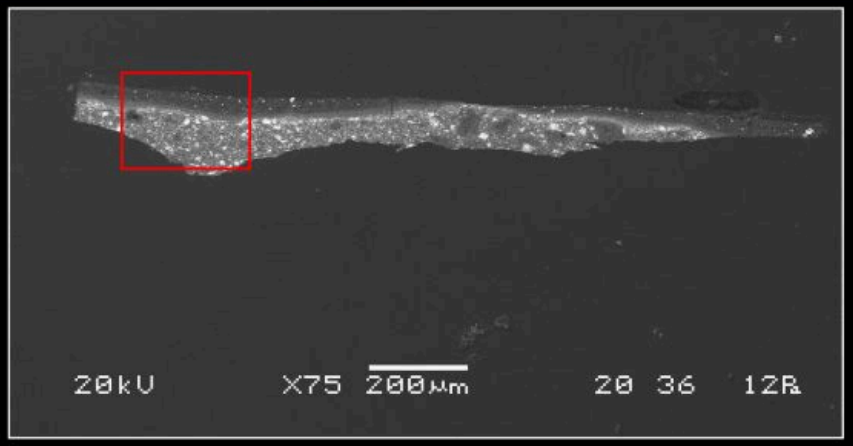


Sample 6 – Cross section, SEM – EDS. Area 3 microanalysis

Joseph and Potifar's wife



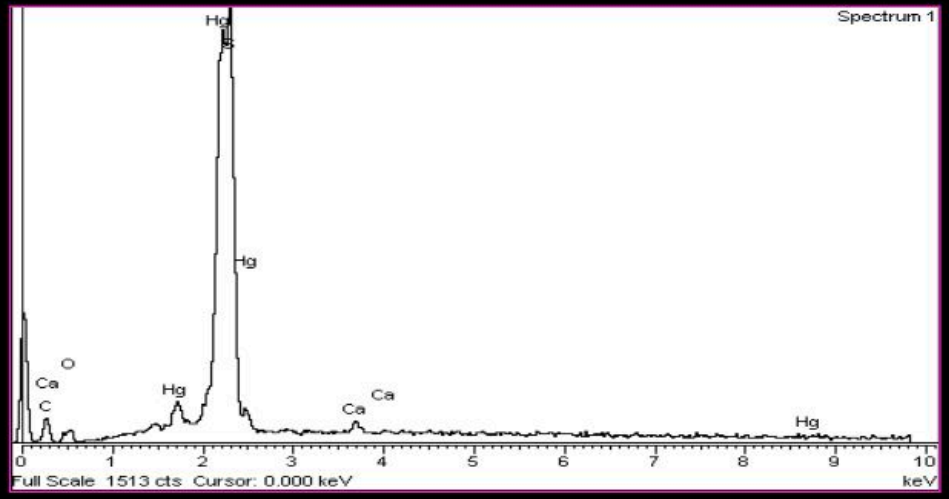
Sample 6 – Cross section, Reflected Light



Sample 6 – Cross section, SEM back scattered electron image

Sample 6 – Cross section, SEM. Point 1 microanalysis

Hg and S are due to Cinnabar (HgS)



Sample 6 – Cross section, SEM – EDS. Point 1 microanalysis

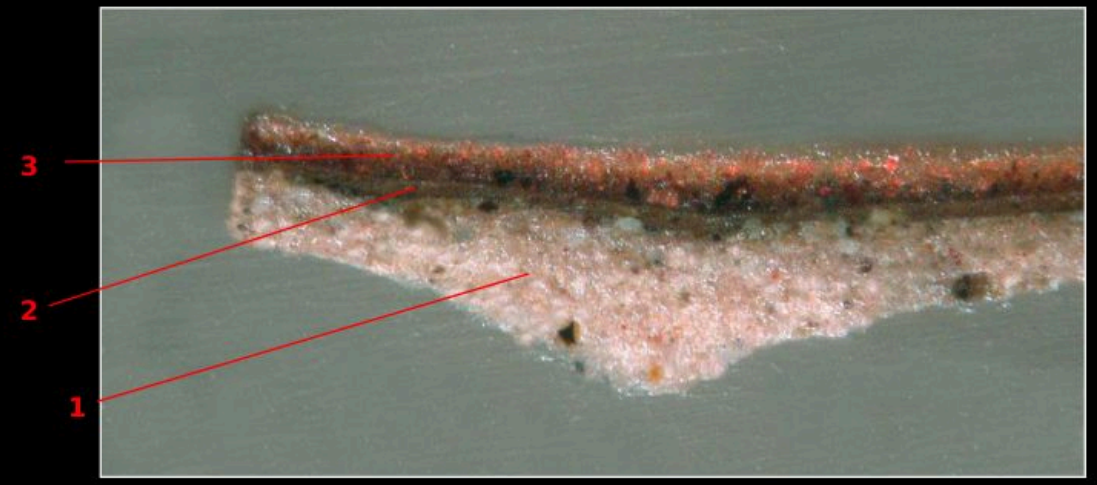
Joseph and Potifar's wife

1 - Beige ground layer of Lead White, Calcite an some granules of Earth pigments.

2 - Red - brown layer made of Earth pigments, Lead White and Calcite.

3 - Red layer of Earth pigments, Calcite and some granules of Cinnabar.

4 - Layers of varnish.



Sample 6 – Cross section, Reflected Light

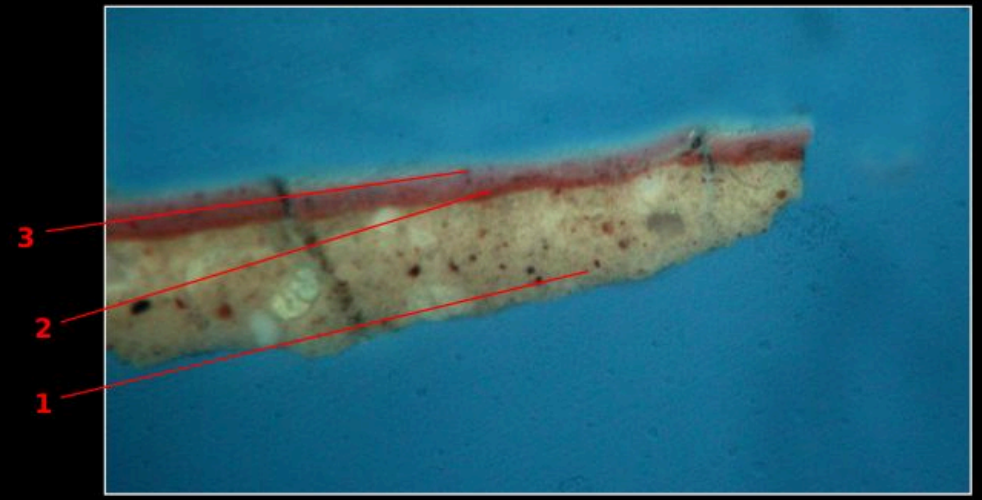
Sample 6 – Cross section, UV Fluorescence

Joseph and Potifar's wife

Sample 7

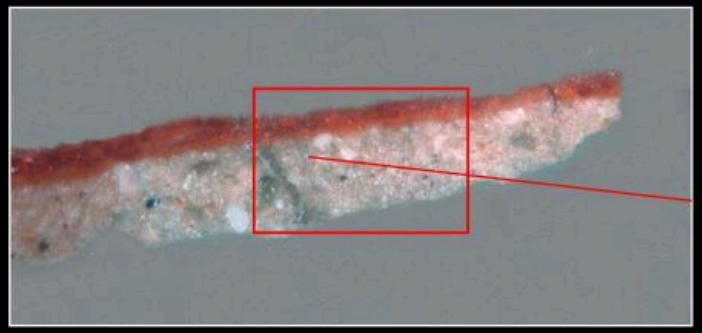
Sample 7 – Cross section Reflected Light

Sample 7: detail

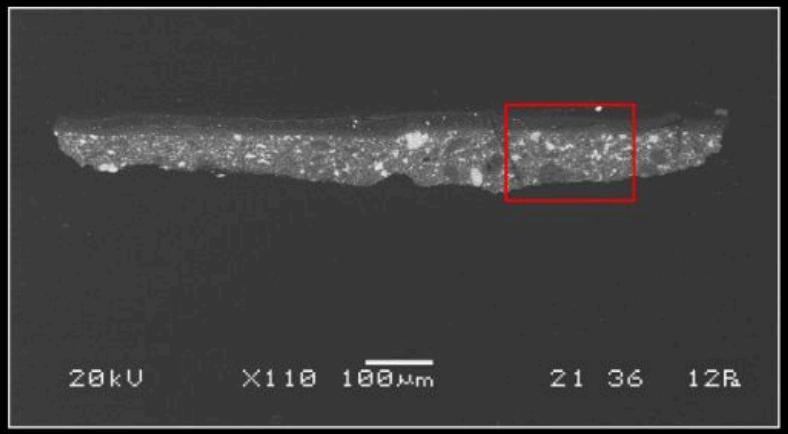


Sample 7 – Cross section, UV Fluorescence

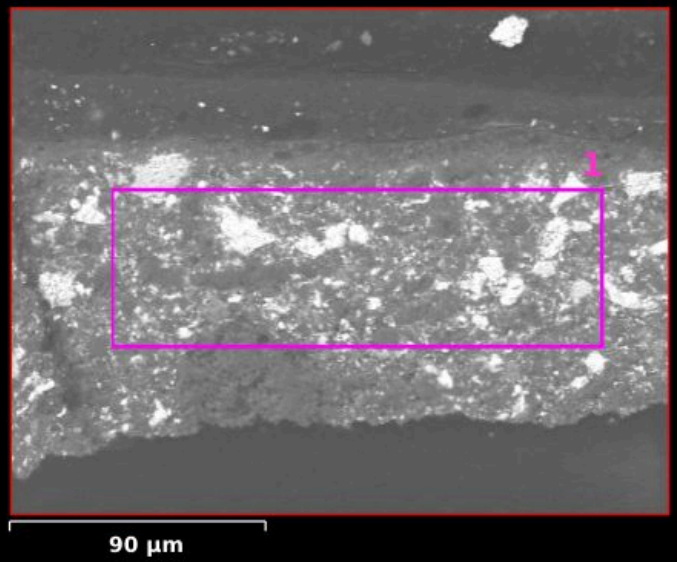
Joseph and Potifar's wife



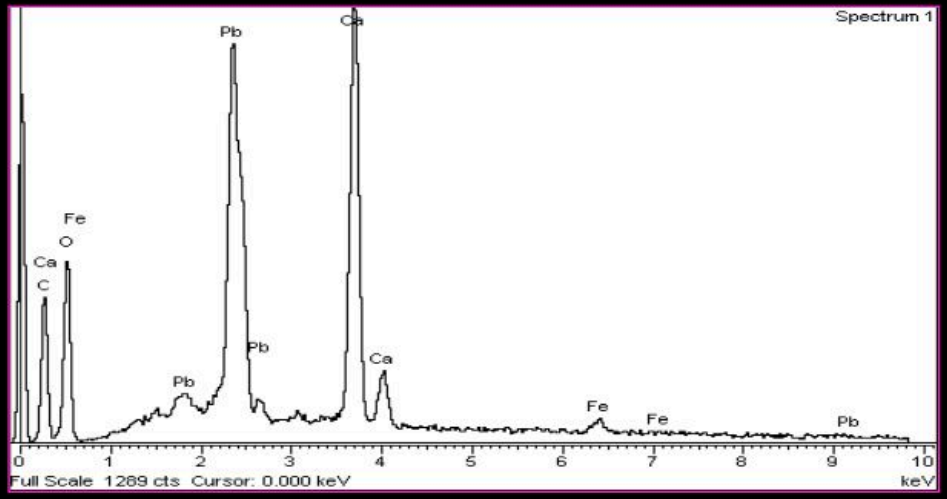
Sample 7 – Cross section, Reflected Light



Sample 7 – Cross section, SEM back scattered electron image



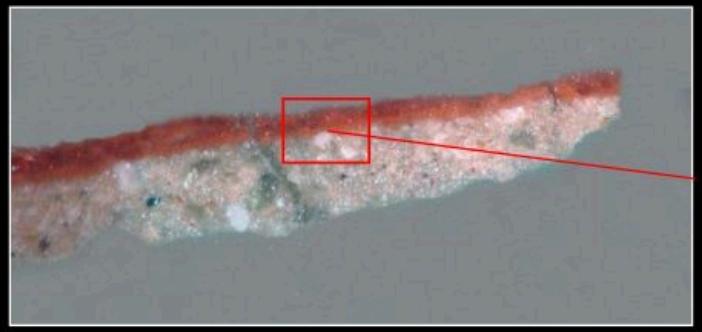
Sample 7 – Cross section, SEM. Area 1 microanalysis



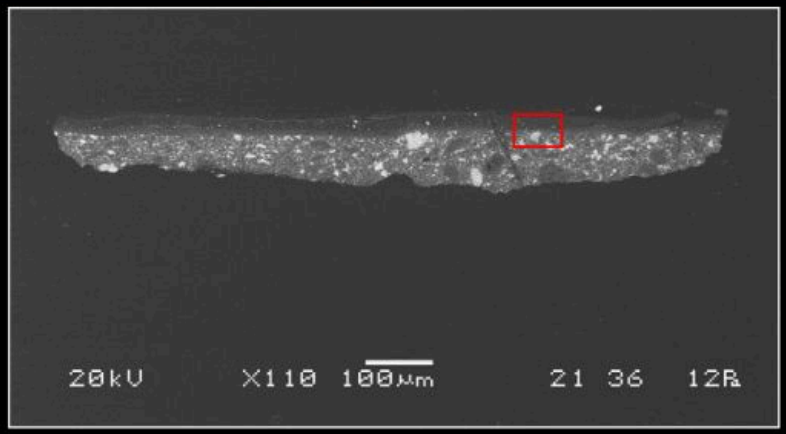
Sample 7 – Cross section, SEM – EDS. Area 1 microanalysis

Area 1: presence of Ca and Pb are associated to Calcite ($CaCO_3$) and Lead White ($2PbCO_3 \cdot (OH)_2$). Si and Fe are due to Earth pigments.

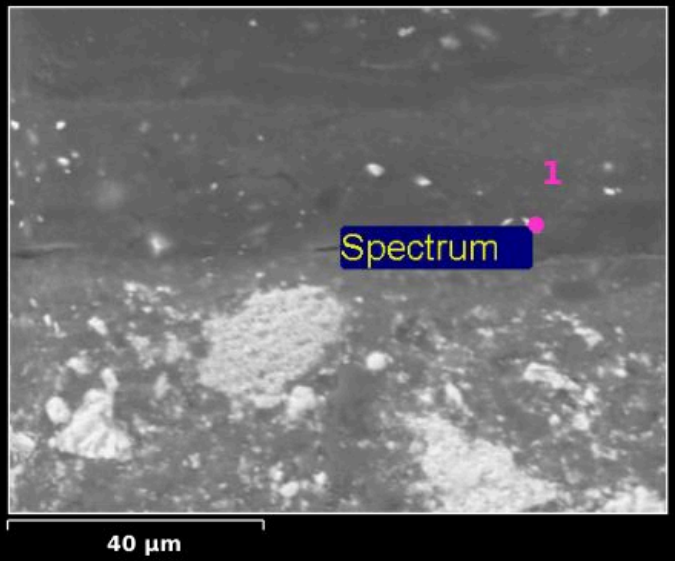
Joseph and Potifar's wife



Sample 7 – Cross section, Reflected Light

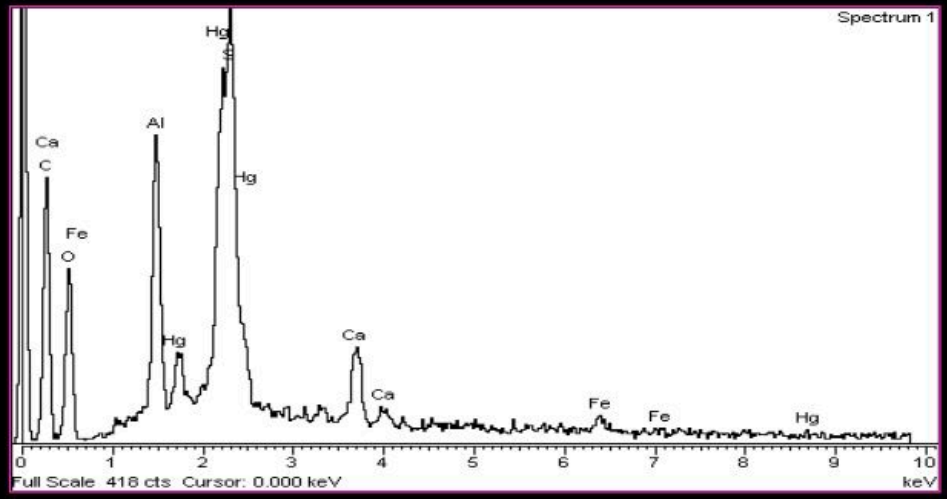


Sample 7 – Cross section, SEM back scattered electron image



Sample 7 – Cross section, SEM. Point 1 microanalysis

EDS microanalysis of Point 1 revealed the presence of Al, Si, Fe related to Earth pigments and Hg, S related to Cinnabar (HgS).



Sample 7 – Cross section, SEM – EDS. Point 1 microanalysis

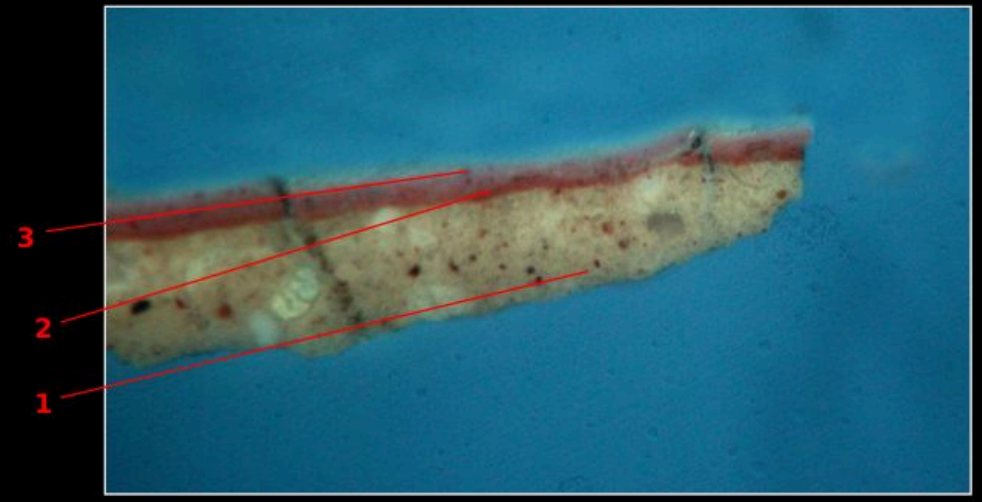
Joseph and Potifar's wife

1 - Beige ground layer of Lead White, Calcite an some granules of Earth pigments.

2 - Red layer made of Earth pigments and Cinnabar.

3 – Thin layer of Red Lake.

Sample 7 – Cross section Reflected Light



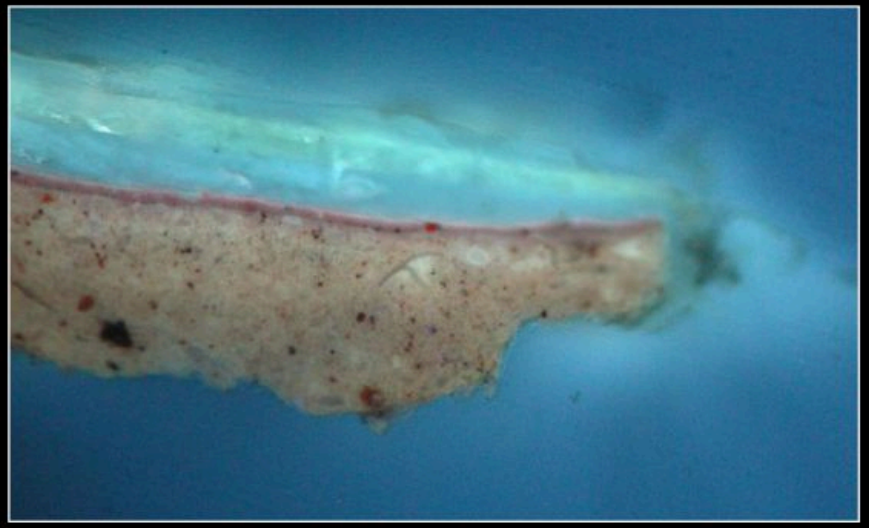
Sample 7 – Cross section, UV Fluorescence

Joseph and Potifar's wife

Sample 8

Sample 8 – Cross section Reflected Light

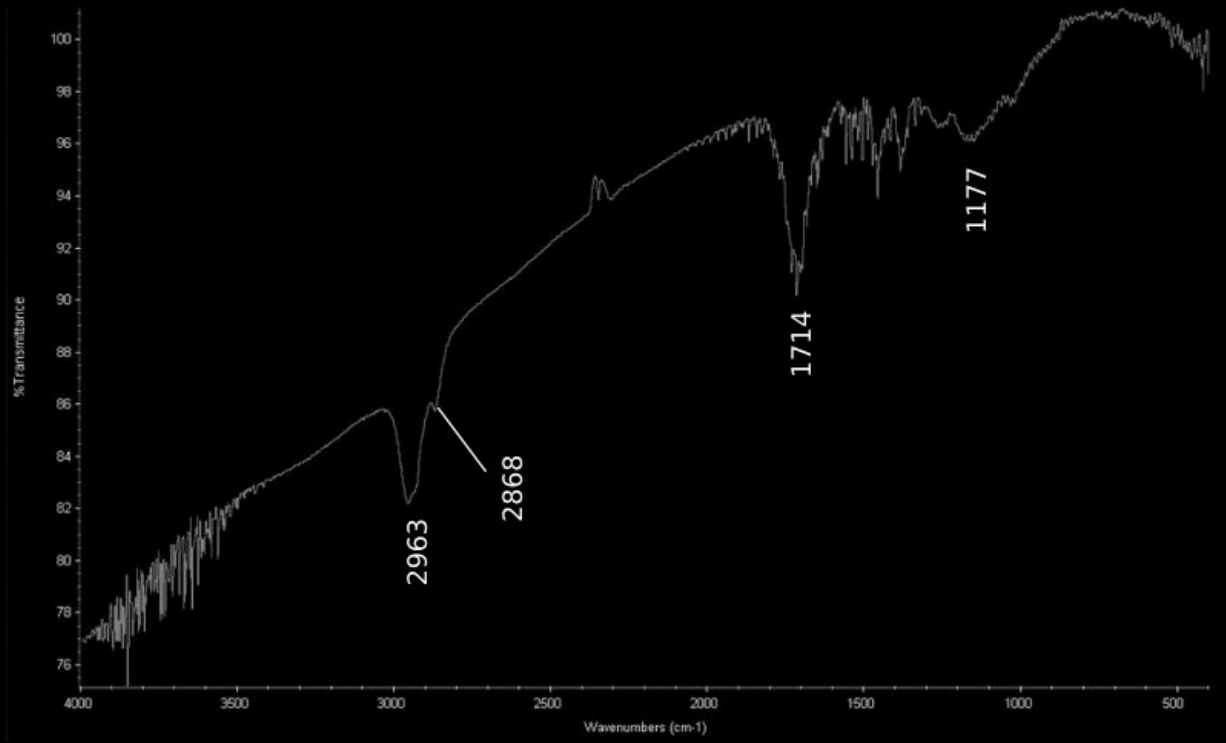
Sample 8: detail



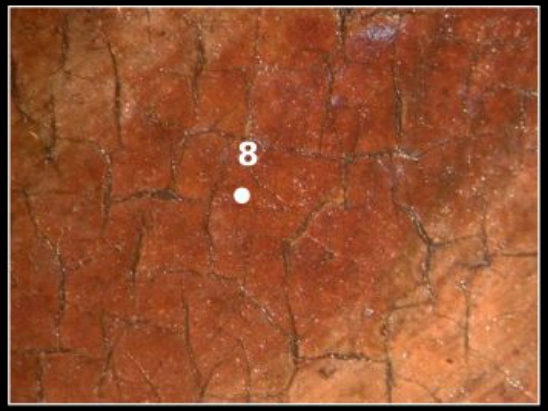
Sample 8 – Cross section, UV Fluorescence

Joseph and Potifar's wife

Sample 8



Sample 8 – FT-IR spectroscopy



Sample 8: detail

FT-Ir spectroscopy revealed the use of an oily binder.

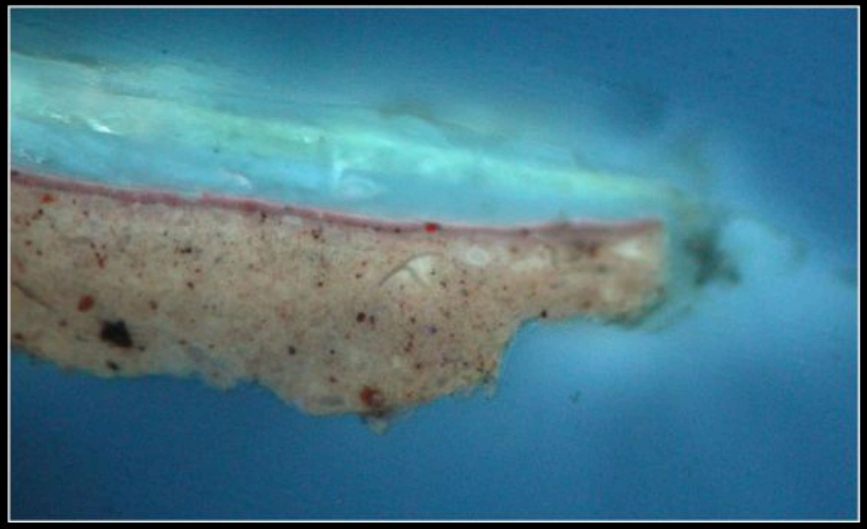
Joseph and Potifar's wife

1 - Beige ground layer of Lead White, Calcite an some granules of Earth pigments.

2 - Red layer made of Earth pigments and Cinnabar.

3 – Thin layer of Red Lake.

Sample 8 – Cross section Reflected Light



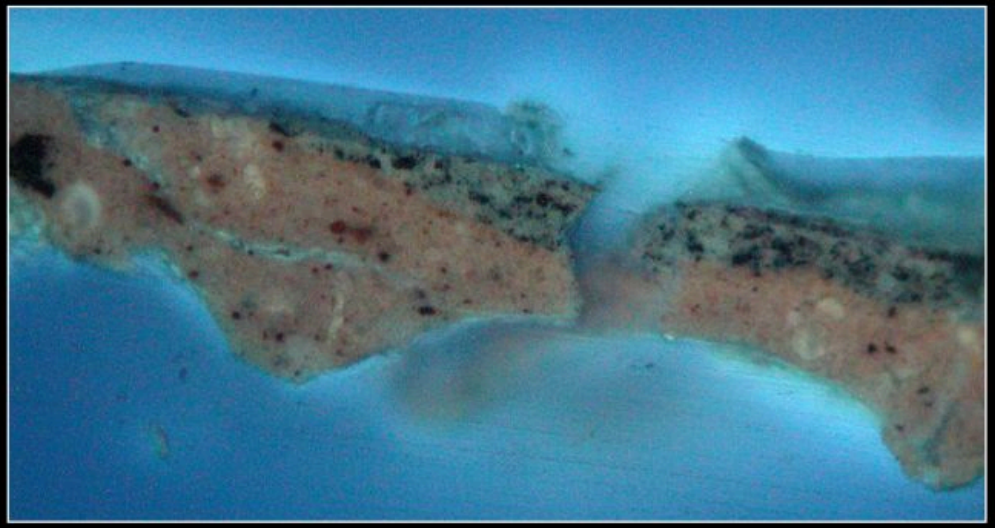
Sample 8 – Cross section, UV Fluorescence

Joseph and Potifar's wife

Sample 10

Sample 10 – Cross section Reflected Light

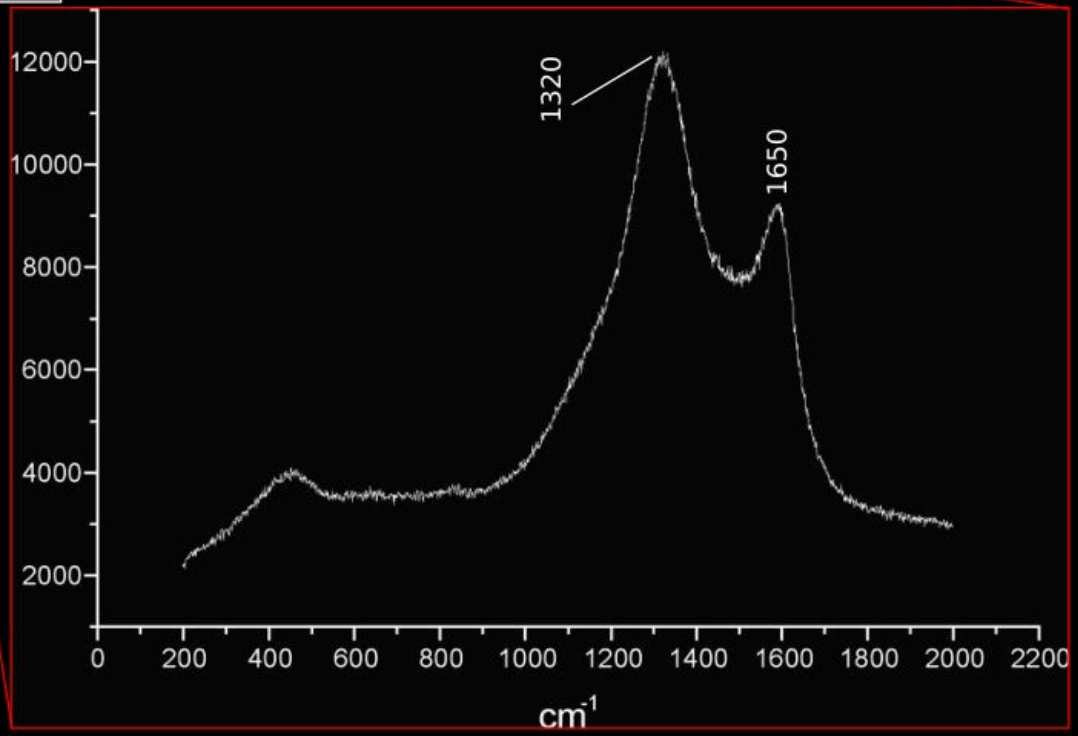
Sample 10: detail



Sample 10 – Cross section, UV Fluorescence

Sample 10 – Cross section Reflected Light

Micro – Raman spectroscopy of Point 1 revealed the presence Carbon Black.



Sample 10 – Point 1 Micro – Raman Spectroscopy

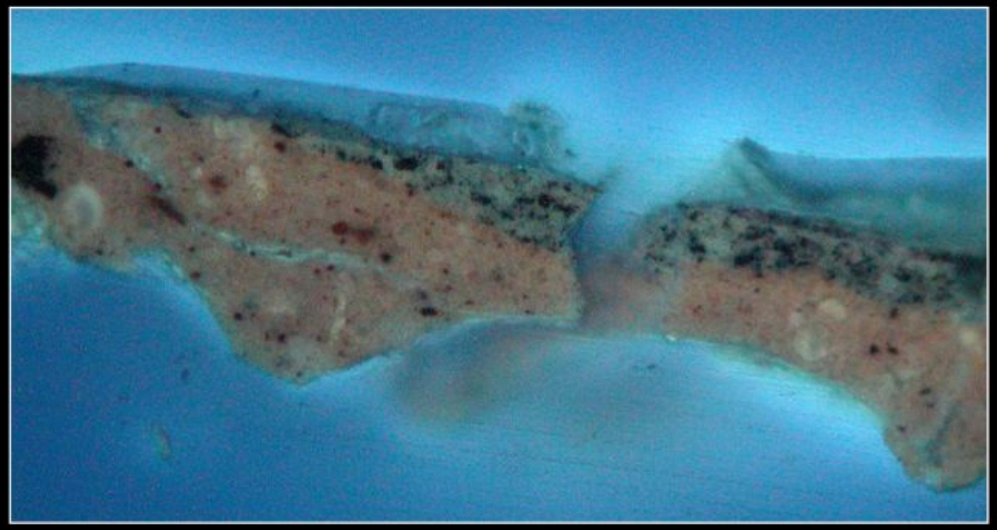
Joseph and Potifar's wife

1 - Beige ground layer of Lead White, Calcite an some granules of Earth pigments.

2 – Gray layer made of Calcite and Carbon Black.

3 – Black layer made of Carbon Balck.

Sample 10 – Cross section Reflected Light



Sample 10 – Cross section, UV Fluorescence

Cod. Ed. P1320
Firenze, Ottobre 2005

^{210}Pb measurement by gamma spectroscopy on a Lead White sample

Joseph and Potifar's wife

The materials with Pb in sample 4 are two: in the Priming made of Lead White ($2PbCO_3 \cdot Pb(OH)_2$) and Calcite, in the white layer made of Lead White ($2PbCO_3 \cdot Pb(OH)_2$), Calcite and Carbon Black. To detect the presence of ^{210}Pb radioisotope, the Lead White sample 4 was analyzed with a Gamma Spectrometer for 278 hours, with a high resolution and low noise detector GX-HP Ge (ORTEC). A Radioisotope is considered totally decayed when 12 t1/2 are passed. The data shown in the chart below indicate that no activity of ^{210}Pb isotope was found in the lead of the Priming and in the lead of the white layer of sample 4. Since ^{210}Pb has a t1/2=20.4 years, the materials with a Pb content are therefore older than 250 years.

Sample 4

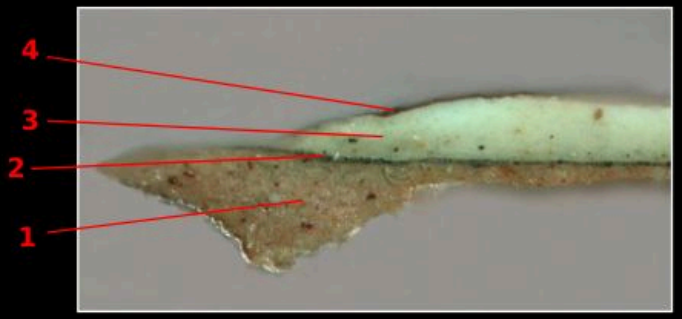
Sample 4: detail

1 - Beige ground layer of Lead White, Calcite an some granules of Earth pigments.

2 - Dark thin layer made of granules of Carbon Black .

3 - White layer of Lead White and some granules of Calcite. Are also present some particles of Carbon Black.

4 - Brownish thin layer of Earth pigments.



Sample 4 – Cross section, Reflected Light

	Mass (mg)	Activity(Bq/g)
P 1320-4 (sample 4)	0,001	0,000

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Calendar age [cal BP]: conversion to cal AD\cal BC according to the relation

cal AD = 1950 – cal BP

or

cal BC = cal BP - 1950

Sample	Analysed fraction	Mass [mg]	UtC Nr	δ13C	14C Age [BP]	Calendar Age [cal BP]
P 1320-12	cellulose	1.590	13929	-25.4	527+\- 49	**2S cal AD 1304 – 1365** **1383 – 1449**

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Diagnostic Investigation on *"Joseph and Potifar's wife "* attributed to Titian

Oil on canvas cm 125 x 102

- *CONCLUDING REMARKS*

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- CONCLUDING REMARKS

Joseph and Potifar's wife

1- The multispectral imaging and the chemical analysis revealed that the painting was partly subjected to a second painting phase

2- Preparation: Calcite ($CaCO_3$), Lead White ($2PbCO_3 \cdot (OH)_2$) and Earth Pigments

3- Palette of colours: Lead White, Azurite, Cinnabar, Red Lake, Earth Pigments,, Calcite, Carbon Black, Gold Leaf

4- Binding Media: Oil

5- Dating: C14
Organic contamination of the canvas sample led to a
Calendar Age
[cal BP] of AD 1304 – 1365 and 1383 – 1449 with a 2S calibration
correction

6- 210Pb measurement
No Activity of this Isotope was detected.
The sample with a Pb content showed to be older than 250

7- Calcite in the Preparation layer.

No Calcite Preparation has been found so far in Italian paintings from early XVI century. As for Titian paintings, we can rely on scientific data from Editech Archive and other sources:

Editech Archive:

-P 642 "Madonna delle rose" GESSO AND GLUE
-P 666 "Flora" GESSO AND GLUE
-P 704 "Francesco Maria della Rovere" GESSO AND GLUE
-P 778 "Deposizione" GESSO AND GLUE
-P 798 "Ritratto di Lavinia" GESSO AND GLUE

From other sources:

-"San Marco in trono e Santi" GESSO AND GLUE
-"L'Assunta" GESSO AND GLUE
-"Pala Pesaro" GESSO AND GLUE
-"Martirio di S. Lorenzo" GESSO AND GLUE
-"Madonna col bambino e Santi" GESSO AND GLUE
-"La Fede" GESSO AND GLUE

Calcite preparations from early XVI century are to be found in Northen European paintings or from late XVI century onward **in Italy**

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